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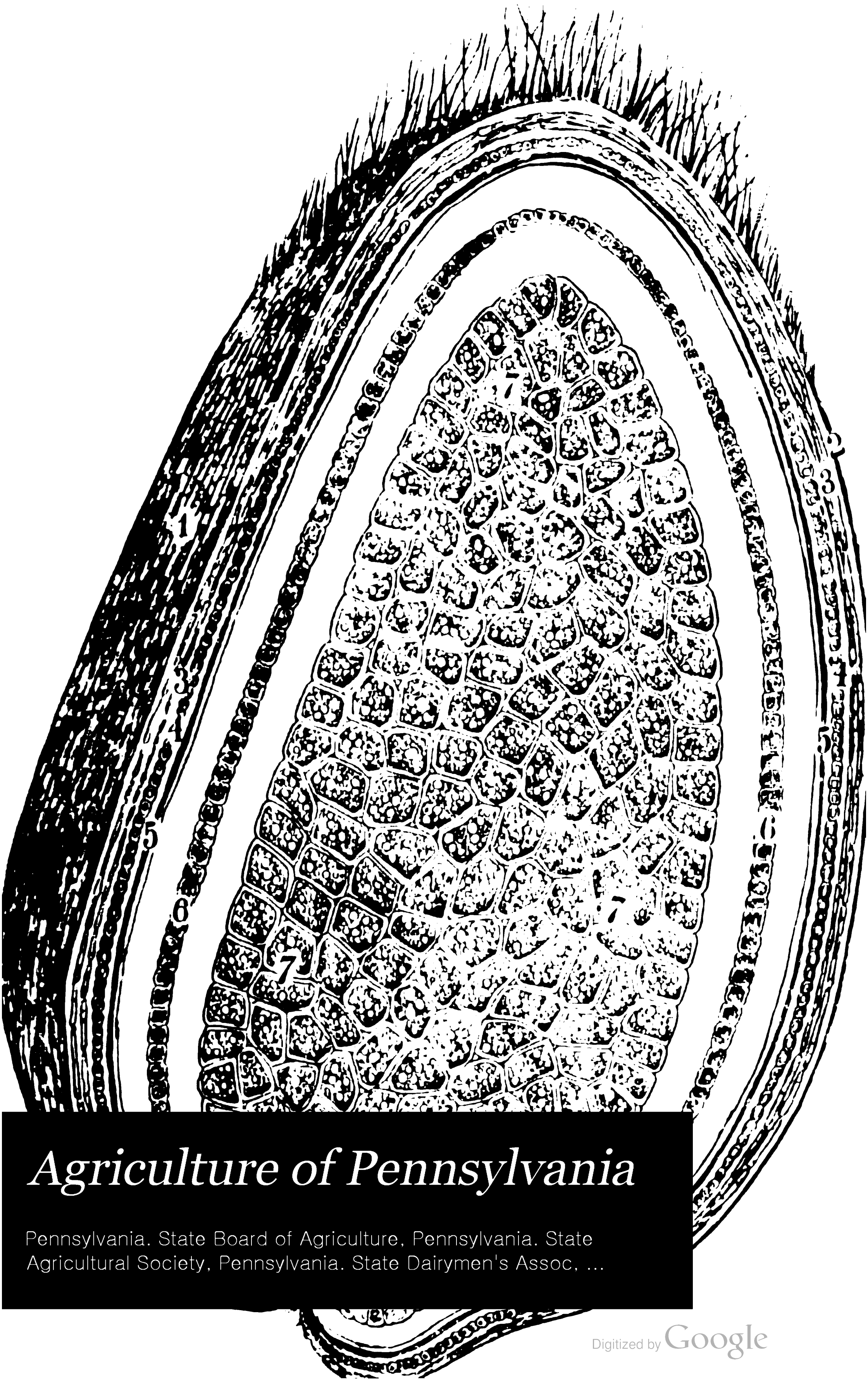

Agriculture of Pennsylvania

Pennsylvania. State Board of Agriculture, Pennsylvania. State Agricultural Society, Pennsylvania. State Dairymen's Assoc, ...

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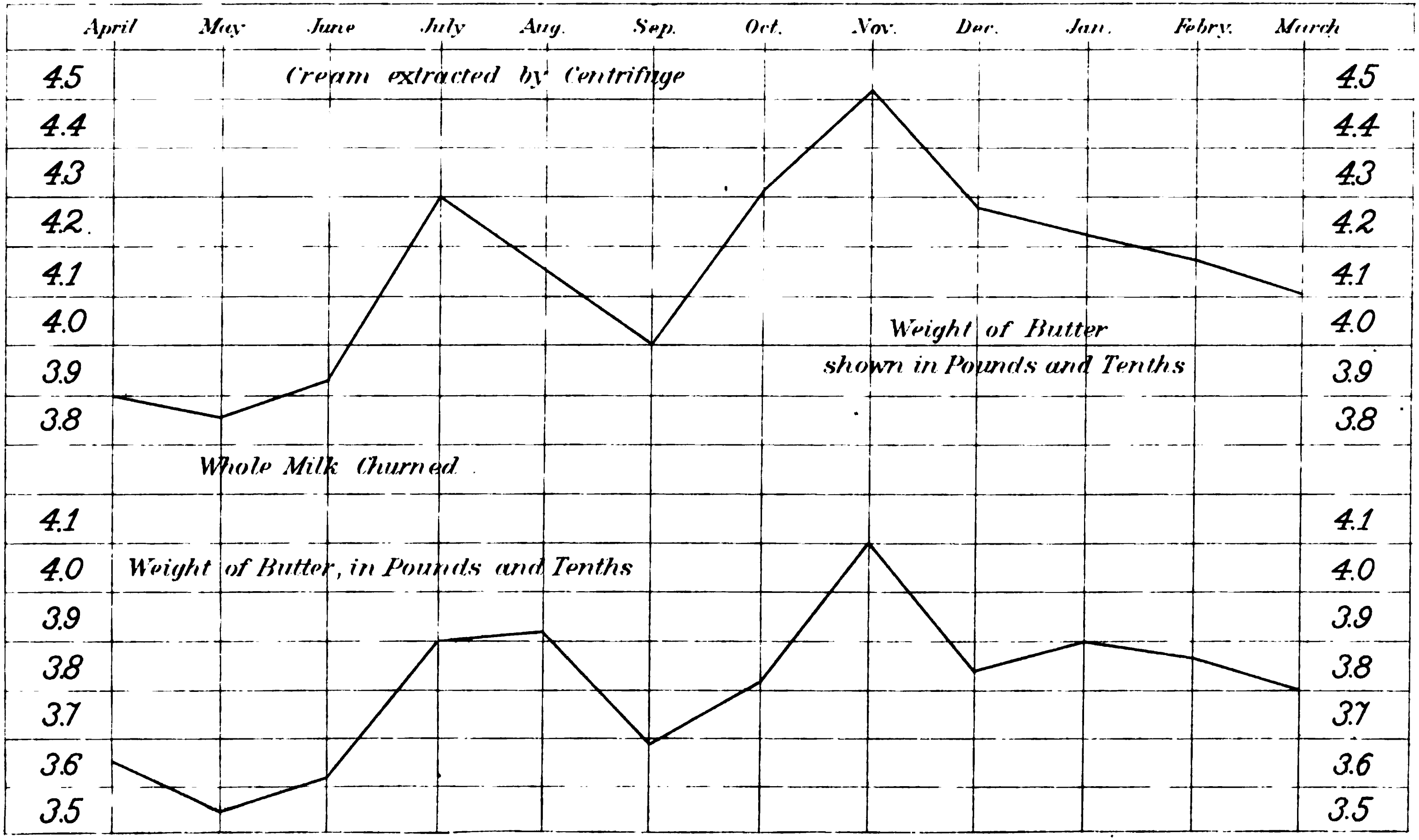

From Danish Experiments.

THE COMMONWEALTH OF PENNSYLVANIA.

AGRICULTURE OF PENNSYLVANIA,

CONTAINING

REPORTS

OF THE

STATE BOARD OF AGRICULTURE,

THE

STATE AGRICULTURAL SOCIETY, THE STATE DAIRYMEN'S ASSOCIATION, THE STATE HORTICULTURAL ASSOCIATION, AND THE STATE COLLEGE,

FOR 1885.

HARRISBURG:
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1886.

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NINTH ANNUAL REPORT

OF THE

Pennsylvania Board of Agriculture,

FOR THE YEAR 1885.

PENNSYLVANIA BOARD OF AGRICULTURE, 1885.

Members Ex-Officio.

His Excellency Governor R. E. Pattison.
Hon. J. Simpson Africa, *Secretary of Internal Affairs.*
Dr. E. E. Higbee, *Superintendent of Public Instruction.*
Hon. J. B. Niles, *Auditor General.*
Dr. G. W. Atherton, *President of the Pennsylvania State College.*

Appointed by the Governor.

		Term expires.
Dr. John P. Edge	Downingtown	1886
Col. James Young	Middletown	1888
Col. V. E. Piollet	Wysox	1887

Elected by County Agricultural Societies.

			Term expires.
Adams	I. Garretson	Bigler	1888
Armstrong	F. K. Patterson	Freeport	1886
Beaver	A L. McKibben	Green Garden	1887
Bedford	Jos. E. Noble	Waterside	1886
Berks	J. G. Zerr	Geiger's Mills	1886
Blair	J. D. Hicks	Tyrone	1886
Bradford	H. L. Scott	Towanda	1886
Bucks	E. Reeder	New Hope	1887
Butler	H. M. Wise	Harmony	1888
Centre	E. W. Hale	Bellefonte	1888
Chester	Thos. J. Edge	West Chester	1887
Clarion	John F. Brown	Clarion	1888
Clinton	Joel A. Herr	Cedar Springs	1887
Columbia	Chandlee Eves	Millville	1888
Crawford	M. W. Oliver	Springboro'	1886
Cumberland	C. H. Mullin	Mt. Holly Springs	1888
Dauphin	G. Hiester	Harrisburg	1888
Delaware	Elwood Harvey	Chester	1886
Erie	J. C. Thornton	Avonia	1886
Indiana	A. D. Sutton	Indiana	1886
Jefferson	Jas. McCracken, Jr.	Frostburg	1887
Juniata	Prof. D. Wilson	Port Royal	1888
Lackawanna	H. H. Colvin	Dalton	1888
Lancaster	H. M. Engle	Marietta	1886
Lawrence	D. H. Wallace	New Castle	1885
Lebanon	C. H. Lantz	Lebanon	1885
Lehigh	J. P. Barnes	Allentown	1887
Luzerne	John B. Smith	Kingston	1888
Lycoming	D. H. Foresman	Williamsport	1888
Mercer	Robert McKee	Mercer	1887
Montour	M. D. L. Sechler	Danville	1886
Northampton	Asher D. Shimer	Bethlehem	1885
Northumberland	W. C. Packer	Sunbury	1888
Somerset	C. C. Musselman	Somerset	1885
Schuylkill	J. S. Keller	Orwigsburg	1887

			Term expires.
Sullivan	L. B. Speaker	Hill's Grove	1888
Susquehanna	J. F. Butterfield	Montrose	1886
Tioga	J. W. Mather	Wellsboro'	1886
Union	Philip Frederick	Lewisburg	1887
*Venango	M. C. Beebe	Pleasantville	1886
†Venango	William Gates	Oil City	1886
Warren	Emry Davis	Sugar Grove	1886
Washington	John McDowell	Washington	1887
Wayne	N. F. Underwood	Lake Como	1888
York	W. S. Roland	York	1886

OFFICIAL LIST.

President.

His Excellency R. E. Pattison.

Vice Presidents.

C. C. Musselman, D. H. Foresman, J. P. Barnes.

Executive Committee.

His Exc'y R. E. Pattison, N. F. Underwood, G. Hiester,
M. C. Beebe, J. A. Herr, Dr. J. P. Edge,
D, Wilson, E. Reeder, T. J. Edge, (*ex-officio.*)

Advisory Committee.

Dr. J. P. Edge, D. Wilson, G. Hiester,
Thomas J. Edge, (*ex-officio.*)

Secretary.

Thomas J. Edge, Harrisburg.

Botanist.

Thomas Meehan, Germantown.

Pomologist.

E. Satterthwait, Jenkintown.

Chemist.

‡Prof. W. H. Jordan, State College.
§Dr. F. A. Genth, University of Pennsylvania.

Consulting Veterinary Surgeon.

Prof. R. Shippen Huidekoper, University of Pennsylvania.

Veterinary Surgeon.

Dr. F. Bridge, West Philadelphia.

Entomologist.

Prof. W. A. Buckhout, State College.

Microscopists, Hygeinists and Food Inspectors.

Dr. Henry Leffman. Philadelphia.
Prof. C. B. Cochran, West Chester.

Ornithologist.

B. Harry Warren, West Chester.

Meteorologist.

J. L. Heacock, Quakertown.

Fish Culturist.

Capt. M. P. Peirce, Philadelphia.

Mineralogist.

Prof. F. A. Genth, University of Pennsylvania.

Geologist.

Prof. J. P. Lesley, State Geological Survey.

Stenographer.

Col. H. C. Demming. Harrisburg.

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* Died July 29, 1885.

† Elected October 1, 1885.

‡ Resigned June 10, 1885.

§ Elected June 20, 1885.

PROCEEDINGS

OF THE

Pennsylvania Board of Agriculture.

MINUTES OF THE ANNUAL MEETING.

Held at Harrisburg, commencing January 28, 1885.

Board called to order in the Supreme Court-room at half past two, P. M., by Hon. R. E. Pattison, Governor, in the chair.

Present—Hon R. E. Pattison, J. Simpson Africa, Secretary of Internal Affairs; Dr. E. E. Higbee, Superintendent of Public Instruction; G. W. Atherton, President State College; Dr. J. P. Edge, Colonel James Young, and Messrs. Garretson of Adams, Patterson of Armstrong, McKibben of Beaver, Noble of Bedford, Zerr of Berks, Scott of Bradford, Reeder of Bucks, Hale of Centre, Herr of Clinton, McCracken of Jefferson, Engle of Lancaster, Barnes of Lehigh, Smith of Luzerne, McKee of Mercer, Sechler of Montour, Musselman of Somerset, Keller of Schuylkill, Frederick of Union, Beebe of Venango, McDowell of Washington, Underwood of Wayne, Roland of York, and Secretary.

The CHAIR named Messrs. Beebe, Reeder, Herr, McCracken, and Engle a committee to receive and report on the credentials of members and delegates.

After a recess of twenty minutes, the Committee on Credentials, by Mr. BEEBE, chairman, reported that Messrs. Eves of Columbia, Garretson of Adams, Foresman of Lycoming, Wilson of Juniata, Hiester of Dauphin, Smith of Luzerne, and Mullen of Cumberland had presented proper credentials showing reëlection for the term of three years, and that Henry H. Wise of Butler and H. H. Colvin of Lackawanna presented credentials showing their right to represent their respective counties for the ensuing three years. The SECRETARY reported that L. B. Speaker had sent him proper credentials as a member from Butler.

The committee further reported that the following delegates were present with proper credentials from their respective societies: Farmers' Protective Association of Philadelphia, E. Satterthwait, S. H. R. Rowland, W. C. Hawkins, E. Brinton, W. Sterling, J. Wilson, S. Davis, W. Rhoads, J. Preston Thomas; Chester County Agricultural Society, W. P. Hazard, A. Sharpless, J. Cheston Morris, E. Brinton, T. J. Edge; Oxford Agricultural Society, (Chester county,) D. H. Branson; Solebury Farmers' Club, I. Ely, J. Roberts, W. Kenderdine; Chadd's Ford Farmers' Club, Dr. J. Cheston Morris, H. Darlington, W. P. Hazard, E. Brinton; Glenbury Farmers' Club, I. Ellis, H. W. Northrup, I. G. Northrup; Fulton Grange, No. 66, T.

Stubbs; Pleasant Valley Farmers' Club, John Hoffa; Philadelphia Grange, No. 645, J. B. Kirkbridge, G. Hart; Pennsylvania State Dairymen's Association, A. M. Fuller and W. P. Hazard.

The same committee reported that a certificate had been presented showing the election of W. L. Archer to represent the Burgettstown Agricultural Society of Washington county, but that, on account of an informality, they (in the absence of Mr. Archer) recommend that it be laid over for the present.

An election for officers having been ordered, the CHAIR named Messrs. Mullen and Scott as tellers, when Messrs. Musselmen of Somerset, Foresman of Lycoming, and Barnes of Lehigh were nominated for the position of vice-president. There being but one nomination for each position, the CHAIR, on motion, cast the ballot of the meeting for the three nominees, who were accordingly declared elected.

Messrs. Beebe of Venango, Wilson of Juniata, Reeder of Bucks, Herr of Clinton, Roland of York, McDowell of Washington, Underwood of Wayne, Hiester of Dauphin, Engle of Lancaster, and Dr. Edge of Chester were nominated as members of the Executive Committee. A ballot having been taken, the tellers announced that Messrs. Beebe, Wilson, Reeder, Herr, Underwood, Hiester, and Dr. J. P. Edge were elected.

Thomas J. Edge was then nominated for the position of secretary, and there being but one nomination, the Chair was directed to cast the ballot of the meeting for the nominee, who was accordingly declared elected.

Mr. REEDER of Bucks, as chairman, then presented a partial report of the standing Committee on the Dairy and Dairy Products, when Dr. J. CHESTON MORRIS, on behalf of the Social Science Association of Philadelphia, presented a draft of an act prepared by that association entitled "An act to prevent the traffic in adulterated, impure, and unwholesome milk, and to regulate the sale of milk."

After a full explanation of the provisions of the act by Dr. J. C. MORRIS, its various sections were discussed by Messrs. Abbott, McKibben, Morris, Reeder, Piollet, McDowell, Northrup, Dr. Edge, Beebe, Peirce, and Secretary.

At the close of the discussion, Dr. J. P. EDGE of Chester offered the following, which was seconded by Colonel PIOLLET of Bradford, and unanimously adopted:

"*Resolved*, That, after hearing read the full text of an act prepared by The Social Science Association of Philadelphia, entitled 'An act to prevent traffic in adulterated, impure, and unwholesome milk, and to regulate the sale of milk,' and having heard it explained by the delegates of the said association, this Board hereby expresses itself in hearty accord with the effort which seeks to procure to producers and consumers of milk and of condensed milk, freedom from the injurious effects of adulteration, and we hereby commend the subject to the consideration of the Legislature."

After acting on miscellaneous business, on motion adjourned.

THURSDAY MORNING, *January 29, 1885.*

Board called to order at half past eight, A. M., by Hon. R. E. PATTISON in the chair.

On behalf of the Executive Committee, the SECRETARY reported that the committee had nominated the following committee and honorary officers, viz: Advisory Committee, Messrs. Dr. Edge, Wilson, Hiester, and the Secretary of the Board (*ex officio;*) and as honorary officers and members, Botanist, Thomas Meehan, Germantown; Pomologist, E. Satterthwait, Jenkintown; Chemist, Prof. W. H. Jordan, State College; Consulting Veterinary Surgeon, Prof. Rush Shippen Huidekoper, University of Pennsylvania; Veterinary Surgeon, Dr. F. Bridge, V. S., West Philadelphia; Microscopist and Hygienist, Dr. H. Leffman, Philadelphia; Ornithologist, B. Harry Warren, Smithsonian Institute; Meteorologist, J. L. Heacock, Quakertown; Fish-culturist, Captain M. P. Peirce, Philadelphia; Mineralogist, Prof. F. A. Genth, University of Pennsylvania; Geologist, Prof. J. P. Lesley, State Geologist; Stenographer, Col. H. C. Demming, Harrisburg.

After discussion, the subject of district meetings was indefinitely postponed.

The Committee on Legislation, through Mr. BEEBE, chairman, presented a draft of an act relating to the fence laws of the State, which, after discussion, section by section, was indorsed by the Board.

Dr. J. P. EDGE offered the following, which, after discussion, was unanimously adopted:

"*Resolved*, As the deliberate sentiment of this Board, that the rapid reduction of the timber area of this State calls for the enactment of some efficient legislation to check the wanton destruction of our forests and for the promotion of the growth of timber under the direct oversight of the State, and that, as a preliminary measure to secure this end, we hereby urge on the present Legisluture the passage of an act which shall give the Executive of the State authority to appoint a commission on forestry, with full power to consider the whole question as it relates to the best interests of the Commonwealth, and with a view to recommending such legislation as may secure the same." The Secretary was directed to furnish each member of the Legislature with a copy of the resolution properly certified, and the Committee on Legislation were directed to prepare a proper bill to secure the proposed end.

HENRY PALMER, of Chester county, offered the following, which, after consideration and discussion, was referred to His Excellency the Governor and his special agent, the Secretary of the Board, for action:

"*Resolved*, That the Secretary of the Board of Agriculture be requested to prepare and present to the Legislature an act supplemental to the present act for the suppression of contagious pleuro-pneumonia, which shall strengthen the method of the present law and more effectively stamp out the disease."

On motion of Mr. KELLER, the Board proceeded to name a place for holding the next meeting, when Mr. ENGLE presented an invitation from the Lancaster County Agricultural Society to hold it at Lancaster, Mr. PIOLLET and Mr. SCOTT one from the Bradford County Agricultural Society asking that it be held at Towanda, Mr. SMITH one from the Luzerne County Society for Wilkes-Barre, Mr. NORTHRUP one from the Lackawanna County Society to hold it at Scranton, Mr. EVES one from the Columbia County Society to hold it at Bloomsburg, and Mr. HALE one from the Centre County Agricultural Society to hold the Spring meeting at Bellefonte. After a full discussion of the merits of the various places named, a ballot was taken, resulting in the choice of Towanda. On motion, the time at which the meeting should be held was left to the Advisory Committee and resident members.

On motion of Mr. SMITH, seconded by Mr. HERR, the report of the dairy committee was then read and considered.

On motion of the SECRETARY, an essay on "The Oleomargarine Law, and Reasons for its Passage," was read by EDWARD BRINTON, of West Chester, and was followed by the reading of a proposed act to prevent the manufacture and sale of imitation butter and cheese, by the same author. After the reading of the three proposed acts, as submitted by the committee, the subject was declared by the Chair to be open for discussion. After a full discussion of the topic by Messrs. Satterthwait, Carter, Curtis, Branson, McCracken, Beebe, Piollet, and Musselman, Mr. CARTER read the following from the Creamery Mutual Aid Association of Chester and Lancaster counties:

"*To the Pennsylvania Board of Agriculture:*

"At a late meeting of the Creamery Mutual Aid Association of Chester and Lancaster counties, a committee, consisting of J. I. Carter, Edward Brinton, and Joseph H. Brosius, was appointed to present to your Board the views of the Association on the subject of the manufacture and sale of butterine, suine, and other imitation butters. We beg to say that the dairy interest is one of the most important in our Commonwealth. It gives employment to a large number of people of different abilities and conditions. It is a necessary branch of that mixed husbandry so essential to the permanent prosperity of our agricultural population. This dairy interest is now subjected to oppressive competition with imitation or bogus butter. This competition is an illegitimate one, because the whole business of the manufacture and sale of these bogus goods is deceptive and fraudulent. Every process in its manufacture is intended to make it a deceptive imitation of butter. It is not sold upon its own merits, but is put upon a credulous public for something which it is not. The healthfulness of these goods is also doubtful. Unrendered hog fat might easily transmit disease, *trichinosis* included. Its use as butter is not appetizing to think of.

"For the foregoing reasons, and others equally cogent, our Association resolved that stringent legislation is needed on this subject; that restrictive or controlling legislation has hitherto proved unavailing. It is in vain to attempt to regulate such an evil by restrictive laws, as it is to attempt the same with burglary or arson. Strict prohibition is the only safeguard.

"We, therefore, ask your Board, as the representatives of the agricultural interests of this Commonwealth, to take speedy measures to secure the passage of a law prohibiting the manufacture and sale of oleomargarine, butterine, suine, and other imitation butters, within the limits of our Commonwealth."

On behalf of the Committee on Dairy Products, Mr. REEDER (chairman) read the drafts of acts as prepared by that committee, and also the full text of one presented by Edward Brinton, of West Chester, Pa. After a full explanation of the merits of all the bills, and a further discussion of the subject in general terms by Messrs. Branson, Morris, McCracken, Beebe, Piollet, Musselman, Abbott, Carter, Wilson, Hale, Dr. Edge, and the Secretary, Mr. BEEBE, of Venango, offered the following, which was unanimously adopted as the opinion of the Board:

"*Resolved*, That it is the sense of the State Board of Agriculture that to prevent deception in dairy products and for the preservation of the public health, the manufacture and sale of oleomargarine, butterine, suine, and other like products, should be entirely prohibited within this Commonwealth, and the General Assembly are hereby requested to enact legislation necessary to that end."

The SECRETARY then offered the following, which was also adopted:

"*Resolved*, That of the five bills read, the one presented by Edward Brinton, of West Chester, Pennsylvania, seems best calculated to produce the desired results with the least machinery, and that, therefore, the committee be requested to present it to the Legislature with the indorsement of this Board."

On motion of Mr. HAZARD, the Chair appointed Messrs. Beebe, Oliver, McCracken, and the Secretary a committee to represent the Board at the ensuing meeting of the State Dairymen's Association at Meadville.

On motion of Mr. EVES, Mr. MCCRACKEN, of Jefferson, then read an essay on "Farmers' Homes." After a full discussion of the subject-matter of the essay, on motion, adjourned until 2.30, P. M.

THURSDAY AFTERNOON, *January 29, 1885.*

Board called to order at 2.30, P .M., by Hon. R. E. Pattison in the chair

On behalf of the special Committee on Roads, C. C. MUSSELMAN, of Somerset, presented a draft of an act providing a general road law for the State After a general discussion by Messrs. Satterthwait, Musselman, Beebe, Bull, Fuller, McDowell, McCracken, Atherton, Barnes, Smith, and others, Mr. BEEBE offered a resolution providing for an amendment, which was accepted by Mr. Musselman and incorporated in the bill. Mr. ATHERTON then offered the following, which was unanimously adopted:

"*Resolved*, That this Board approve of the provisions of the bill read by C. M. Musselman of Somerset, and recommend its adoption by the Legislature with the amendment presented by M. C. Beebe of Venango."

On motion, Hon. C. C. MUSSELMAN then read an essay on "Farmers' Daughters," which was then discussed by those present.

A communication having been received from the Senate Committee on Judiciary General, requesting that the Board would appoint a committee to appear before that committee at a meeting to be held February 18 to consider the anti-discrimination freight bill, the CHAIR named Messrs. Hiester, Dr. Edge, Piollet, Roland, and Eves as members of the committee.

On motion of Mr. HIESTER, of Dauphin, J. HORACE MCFARLAND then read an essay on "Flowers for Country Homes," which was ordered to be incorporated in the printed proceedings of the meeting.

Mr. W. P. HAZARD then read an essay on "The Claims of the Guernseys as the Best Dairy Breed," the subject matter of which was fully discussed by Messrs. Young, Piollet, Keller, Hazard, Carter, and Secretary, after which the Board adjourned to meet at eight, P. M.

THURSDAY EVENING, *January 29, 1885.*

Board called to order at eight, P. M., by Dr. J. P. BARNES, Vice President, in the chair.

In accordance with the printed programme, an essay on "How to Keep Farmers' Boys on the Farm," by the Secretary, was read and discussed by

Messrs. McDowell, Garretson, Branson, Herr, Smith, and the Secretary.

On motion of Mr. WILSON, JOHN I. CARTER read an essay in answer to the question "How to Make Farming more Profitable," the subject-matter of which was discussed by Messrs. Keller, Engle, Garretson, Branson, Beebe, and Carter.

Dr. J. P. EDGE then read an essay on "Profanity among Farmers," which called out discussion by Messrs. Piollet, McDowell, Herr, Wise, and Beebe.

After answering such questions as were sent to the Secretary, the Board adjourned to meet at Towanda at the call of the Advisory Committee.

MINUTES OF THE SUMMER MEETING,

Held at Towanda, June 17 and 18, 1885.

WEDNESDAY MORNING, *June 17, 1885.*

Board called to order at 10, A. M., by Hon. R. E. PATTISON in the chair.

On behalf of the Bradford County Agricultural Society and the citizens of Towanda, Hon. WILLIAM T. DAVIES welcomed the Board, and was folfollowed by Hon. R. E. PATTISON in reply, on behalf of the members present.

Present—Hon. R. E. Pattison, and Messrs. Atherton of Centre, Young of Dauphin, Piollet of Bradford, Garretson of Adams, Zerr of Berks, Scott of Bradford, Reeder of Bucks, Herr of Clinton, Eves of Columbia, Oliver of Crawford, Harvey of Delaware, Barnes of Lehigh, Smith of Luzerne, Foresman of Lycoming, Shriner of Northampton, Butterfield of Susquehanna. Frederick of Union, McDowell of Washington, Underwood of Wayne, Dr. H. Leffmann, Microscopist of the Board, and Thomas J. Edge. Secretary. At subsequent sessions, Messrs. Patterson of Armstrong, Colvin of Lackawanna, Speaker of Sullivan, and Davis of Warren, were present.

The CHAIR named Messrs. Foresman of Luzerne, Reeder of Bucks, and McDowell of Washington, a Committee on Credentials.

On motion of Mr. BARNES, seconded by Mr. ENGLE, the reading of the minutes of the annual meeting was dispensed with.

On motion, the Board then proceeded to fix the time and place of the fall meeting, when it was moved by Mr. ENGLE that Lancaster be selected as the place of the next meeting, and that it be held at some time during the annual fall exhibition of the State Agricultural Society in Philadelphia.

On motion of Mr. ATHERTON, the resolution was divided, and a vote taken first upon the place at which the meeting should be held, resulting in the choice of Lancaster.

On motion of Mr. ENGLE, seconded by Mr. SMITH, the time for holding the meeting was left to the Advisory Committee, with the understanding that a time during the continuance of the State fair should be selected.

Mr. FORESMAN of Lycoming, on behalf of the Committee on Credentials, reported that Asher D. Shimer of Northampton had presented credentials showing his election as a member of the Board from that county, for a term of three years; they also reported the following delegates present:

Towanda Grange, No. 200—E. W. Hale, J. G. Patton, and B. F. Bowman.

Troy Grange—L. P. Williams and Mrs. L. P. Williams.

Colley Grange, No. 365—C. F. Hunsinger, Earle Allen, and H. P. Hunsinger.

Warren County Agricultural Society—C. W. Stone.

Creamery Mutual Aid Association of Chester and Lancaster Counties—Milton Darling, Hayes A. Clark, and John I. Carter.

Susquehanna Grange, No. 74—Kirby Bunnell and Horace Brewster.

Glenburn Farmers' Club of Lackawanna County—H. W. Northrup and Andrew Miller.

On behalf of the standing Committee on Dairy Products, Mr. REEDER, chairman, presented a full report from that committee, which, after discussion by Messrs. Harvey, Carter, Atherton, and others, was referred back to the committee, with instructions to propose and report some definite line of action for the acceptance of the Board.

After the transaction of miscellaneous business, on motion adjourned to meet as per programme.

WEDNESDAY AFTERNOON, *June 17, 1885.*

Board called to order at 2, P. M., by His Excellency, R. E. PATTISON, in the chair.

On motion, Mr. J. W. INGHAM, of Sugar Run, read an essay on "Dairy Farming in Northern Pennsylvania," which elicited discussion from Messrs. Carter, Reeder, Colvin, Searle, Piollet, and Secretary.

On motion of Mr. SMITH, of Luzerne, Captain M. W. OLIVER, of Crawford, read an essay in answer to the question, "What is a Farmer?" the subject-matter of which was discussed by Messrs. Piollet, Harvey, Smith, Herr, Hillis, Searle, and others.

In the absence of the essayist, Dr. ATHERTON (at the request of the Secretary) read an essay by Mr. Beebe, of Venango, on "Gypsum and its Use on the Farm," the matter of which was discussed by Messrs. Harvey, Zerr, Engle, Piollet, Young, Hale, Williams, Elsbree, and Secretary.

On motion, the subject of Mr. Underwood, of Wayne, ("Small Farms *versus* Large Ones,") was continued for presentation at the fall meeting.

Adjourned.

WEDNESDAY AFTERNOON, *June 17, 1885.*

Board met at the court-house to hear an address from Dr. Leffmann, Microscopist and Hygienist of the Board, on "Sanitary Delusions and Superstitions," which was well attended by the citizens of Towanda and vicinity.

THURSDAY MORNING, *June 18, 1885.*

Board called to order at 9, A. M., by Hon. R. E. PATTISON in the chair.

On behalf of the Committee on Dairy Products, Mr. REEDER stated that he had conferred with the delegates present from the creamery associations, and that they had decided to suggest to the Board that the standing Committee on Dairy Products should advise with the committee of the creamery associations, in relation to the enforcement of the law relating to imitation butter.

On behalf of the Executive Committee, the SECRETARY reported that Prof. W. H. Jordon, the Chemist of the Board, had presented his resignation, and that the committee had selected Dr. F. A. Genth, of the University of Pennsylvania, to fill the vacancy. On motion, the report was accepted, and the selection of Dr. Genth confirmed for one year from August 1, 1885.

Mr. UNDERWOOD, of Wayne, offered the following:

WHEREAS, The members of the Pennsylvania Board of Agriculture have learned that Prof. W. H. Jordan has severed his official connection with our Board, and is about to remove to another State; therefore,

Resolved, That we desire to testify to our appreciation of his worth and of his work in our State in the cause of scientific agriculture; that he will have our best wishes for his continued success and prosperity in his new and responsible field of labor, and that while we part from him with regret, we do so in full confidence that the sterling qualities which have rendered him so eminently useful among us will carry him successfully through his future undertakings; and

Resolved, That the Secretary of the Board be instructed to forward to Prof. Jordon a copy of these resolutions.

Resolutions adopted without debate.

On motion, Dr. E. L. Sturtevant, director of the New York experiment station, was invited to address the Board upon the work of the New York experiment station. The subject-matter of his address was discussed by Messrs. McDowell, Young, Secretary, Harvey, Piollet, Engle, Elsbree, Williams, Oliver, Smith. and others, and was listened to with marked attention on part of the audience.

Hon. H. N. WILLIAMS, of Towanda, then read an essay on "Taxation as it Affects other Industries." The subject of the essay called out discussion from Gov. Pattison and Messrs. Harvey, Herr, Foresman, Piollet, and Secretary.

On motion of the SECRETARY, seconded by Mr. PIOLLET, the session was extended for half an hour, and Mr. L. B. SPEAKER, member from Sullivan, read an essay on "Potatoes and Potato Culture." After the discussion following the reading of the essay, adjourned to meet as per programme.

THURSDAY AFTERNOON, *June 18, 1885.*

Board called to order at 2, P. M., by Hon. R. E. PATTISON in the chair.

EASTBURN REEDER, member from Bucks, read an essay on "Poultry as a Source of Profit on the Farm." After a full discussion of the points of Mr. Reeder's essay by Messrs. Barnes, McDowell, Young, Piollet, Oliver, and Secretary, Hon. B. LAPORTE read an essay in answer to the question, "What can the Government do to aid the Farmer?"

J. Andrew Wilt, secretary of the Bradford County Agricultural Society, read an essay on "Then and Now; or, the Past and Present in Agriculture."

After reading essays by John McDowell, member from Washington, on "The Best Breed of Sheep for Profit," and by F. K. Patterson, member from Warren, on "The Tramp in his Legal Aspect," and an address on "Thoroughbred Stock for the Farmer," by Emry Davis, member from Warren, Mr. BARNES, of Lehigh, offered the following:

WHEREAS, At our annual meeting, held at Harrisburg, January, 1885, Col. Victor Piollet extended a hearty and sincere invitation to the State Board of Agriculture to meet at Towanda, at the time of the summer meeting; this invitation was unanimously accepted by the members of the Board. The Board has, in accordance with this invitation, met here, and when I say that it has been good and profitable for us to have been here, I not only express my own conclusion, but also the unanimous decision of all the members present;

Whereas, Our welcome has been so real and hearty, our stay so agreeable and pleasant, and so much encouragement given by the attendance of the citizens, agriculturists, and representatives of agricultural clubs, &c., from this and adjoining counties, and also from a part of New York State bordering on Pennsylvania; therefore,

Be it resolved, That we herewith tender our thanks to the Hon. Victor Piollet, H. L. Scott, and the members of this county and others who have in any way aided or assisted them in their successful efforts to provide a comfortable place to hold our meetings and in otherwise providing for our comfort and pleasant stay during the time of our meeting, and also to the various citizens who furnished essays, and to all who took an active part in the different subjects of discussion presented before the Board, and also to all those who encouraged us by their presence, the ladies included, of course.

Adopted by a rising vote.

On motion, adjourned to meet at the call of the Advisory Committee.

MINUTES OF THE AUTUMN MEETING,

Held at Lancaster, Commencing Wednesday, September 30, 1885.

Board called to order in the court house at 10, A. M., by Hon. R. E. Pattison in the chair.

President, Governor R. E. Pattison, Dr. G. W. Atherton, president State College, Dr. J. P. Edge, Colonel James Young, and Messrs. Zerr of Berks, Reeder of Bucks, Herr of Clinton, Eves of Columbia, Oliver of Crawford, Hiester of Dauphin, Harvey of Delaware, Wilson of Juniata, Engle of Lancaster, Foresman of Lycoming, Barnes of Lehigh, Smith of Luzerne, McKee of Mercer, Shimer of Northampton, Musselman of Somerset, Keller of Schuylkill, Speaker of Sullivan, Butterfield of Susquehanna, Frederick of Union, Underwood of Wayne, Roland of York, and Secretary.

At the close of roll-call, Hon. J. P. Wickersham addressed the Board as follows:

Mr. President:—I am delegated by the Lancaster County Agricultural and Horticultural Society to bid you welcome to Lancaster city and to Lancaster county. We invited you here by resolution passed by the society. They instructed our representatives in your Board to urge the matter to your attention, and we thank you for coming. You are welcome, and we hope to make you entirely at home among us.

There is much about the organization of your Board that commends itself to agriculturists—to farmers all over the State. We like its organization. Represented in it are the State officers, who have—indeed, in whose hands are entrusted all the interests of the Commonwealth, but more especially the interests of agriculture, as that is the leading interest in Pennsylvania. Then, by appointment of the Executive of the State, the general agricultural interests of the State are represented in the Board by the appointment of certain gentlemen. And then the counties, through the agricultural societies, are all represented. I am told that there are now about sixty members of the Board elected by different agricultural societies. Thus combined in the organization of the Board are the highest and most responsible of the executive officers of the State, the general appointees representing the general agricultural interests of the State, and the local societies of the counties of the State. Organized in this way, it seems to me that a Board of this kind ought to exert a powerful influence upon the agricultural interests of the State, and it commends itself in its organization to the farmers throughout this Commonwealth.

Then our people like your reports. They have read them largely, and they consider them, as I know from conference with them, among the best books on the subject of agriculture that are published in this country. There is nothing more practical—nothing better calculated to assist the farming interests than the reports that emanate from this Board.

Then we like the *personnel* of the Board; and in saying this I express, I know, the views of the farming interests of this county. If you will allow me to say it, the Secretary of the Board is doing a wonderful amount of good in the direction of his office. He has been down here to Lancaster county over and over. He has met with our agricultural society. He has been down looking after our diseased cattle, and he carries on correspondence and gives advice to our farmers. He is aiding us in Lancaster, and aiding others all over the Commonwealth; and no better man, I think—he will pardon me for saying it—there is no better man in the Commonwealth for the office he holds than the gentleman that fills this office. And we are glad to welcome him here because of the good he is doing. I hope that no kind civil service will make any change in that department, and that he will be retained in this office as long as he will fill it.

And now allow me to say that we are especially glad to see the Executive of this Commonwealth in the President's chair of this Board. We know very well that he has filled this chair in different parts of the State, and is generally present at these meetings; and we think it is quite in the line of his duty. When the highest officer of the Commonwealth meets with farmers of the different parts of our State, and takes an interest in their work, it is a subject of commendation on their part. The President, the Governor of the Commonwealth, has been in this county on several different occasions. He is here now. I trust, and we all trust, he will come again; and he cannot please us better than by coming often and staying long. It is true, we all know it, that he did not receive a very large vote for the high office he holds in Lancaster county. Democrats are a crop that do not grow largely here, for some reason or other. But we have this to say: We have watched the acts of his administration; and I do say it as being true that they have been in the interest of the Commonwealth, and independent through and through. [Applause.] You will permit me to say personally that I do not believe there has been a purer administration in Pennsylvania in all the years that are gone than the present one. [Renewed applause]. You are welcome here, Mr. President, in your capacity as Governor of the Commonwealth, and no less in your capacity as President of this organization.

Lancaster county is a little empire. We have about nine hundred and fifty square miles of territory. If it were made in a square piece, it would be thirty miles each way. It is a fact interesting to us that there is not in the United States a piece of territory of the same size that is of equal value. If you could sell out Lancaster county, it would bring more money than any other territory, except the territory upon which is located our large cities—more than any other territory of the same size in the United States of America. We had a population in 1880 of one hundred and forty thousand. We have probably one hundred and fifty thousand now. Through Lancaster the breeds and bloods very much epitomize the population of Pennsylvania generally. We have here in some of our townships the English Quakers, plain, steady, industrious, intelligent; better citizens cannot be found anywhere. We had originally, and have still, a large sprinkling of the Scotch-Irish blood—progressive, hard-headed, and just, the pioneers of civilization in the wilderness of Pennsylvania as it was one hundred and fifty years ago. Then we have the Reformed and Lutheran Germans, quiet men, good citizens—quiet enough if you let them alone, but ready to fight stubbornly if you impose upon their privileges or their rights. The largest part of the Lancaster county people are now and were originally the plain, non-resistant German sects, Mennonites, Dunkers, Omish, and other like denominations. These people settled down here from the Old World; and, settling down in Lancaster, they still remain. They are the sub-strata of the present population of this county. No more honest, industrious, thrifty citizens can be found anywhere. Now it has been by the mixture of these bloods and the crossing of these breeds that our present population has grown up; and a better or more promising population I suppose cannot be found anywhere.

Ours is a farming community. We have in this county six hundred and eight thousand acres of territory. Over five hundred thousand acres of that territory improved land—a very large proportion for America—and it leaves about one hundred thousand acres for woodland, city, and town sites, and our rivers. The whole of the Susquehanna river as it runs past here is in Lancaster county. We have in round figures five hundred thousand acres of farming territory, and that is divided into about nine thousand farms. The average size of farms in Lancaster county is between fifty and sixty acres; small farms worked by their owners. In the old countries that is not the fact, as you know. The land is owned generally, and especially in England, by large holders, who hold thousands and sometimes hundreds of thousands of acres of land. The farmers in the old country are tenant farmers; they do not work their own land. But here in Lancaster county and throughout Pennsylvania we have small farms, and worked by their owners; and a more prosperous and happy people cannot be found upon the face of the earth. It is just the way to make people happy—to work their own lands and own their own farms; and that is just the case here with us.

Now the value of the improved land of the county of Lancaster, according to the late census, was sixty-nine million dollars, almost twice as much as that of any other county in this Union outside of Pennsylvania. There is no county in Massachusetts, in Connecticut, New York, Ohio, or Illinois—no county anywhere in the United States of America—where the improved land is worth much more than half as much as the land in Lancaster. Thirty-five million dollars is the highest estimated worth of the improved land in any county in New York, or any other State in the Union. Ours, as I said, is placed at sixty-nine million dollars, and we certainly can claim in this sense to be the garden-spot of Pennsylvania, if not of the United States of America.

True enough, our farmers are not largely represented here to-day. They do not attend our county fairs to the same extent that they in some sections do. Perhaps they do not read agricultural works quite to the same extent. But they experiment as much—they do as good farming—and if you will ride out here, as I trust you will, on any one of the twelve or thirteen turnpike roads, and look at these farms of ours, I think you will believe that Lancaster county deserves the name of the garden-spot of Pennsylvania; and in the name of these farmers, and all these people I represent, I welcome this Board to Lancaster county.

On behalf of the members of the Board, Gov. R. E. PATTISON (chairman) replied as follows:

MR. WICKERSHAM:—On behalf of the Pennsylvania Board of Agriculture, I desire to return thanks for the very kind welcome spoken by you.

When the resolution was presented fixing Lancaster as the place of the next session of the Board, I felt very much, and I have no doubt I can safely say the Board also felt very much, like the officer of whom an excellent story is told, the incident occurring during the battle of Antietam. He was quite a distinguished officer, and during the action his horse was shot from under him. Anxious to secure a horse, worn out during the search, getting very thirsty, he thought he would try and get a drink of water, and at the same time avoid the enemy and prevent his capture. After searching around for some time he discovered a spring. It was well covered with underbrush. It was in a low part of the field, and he thought this was a good place. At the same time he was very much excited and very much alarmed at the closeness of the enemy about him. But he thought he would make the effort. So he pushed his way through the brush, and got down on his knees. In the army he had been distinguished for wearing very large and showy spurs. As he crawled down under the brush and pushed his way through to get down to the spring, stooping down very low, while upon his knees they suddenly slipped and his spurs flew up and struck him in the back. He immediately cried out, "I surrender! I surrender!" supposing the enemy was upon him. [Laughter.] This Board felt very much like this officer when the resolution was presented for the holding of the session of the Agricultural Board at Lancaster, and they immediately, without discussion, surrendered and gave themselves into the possession of the representative from Lancaster.

The Board is all you say about it—the State Board of Agriculture. We have first and foremost in view—I think I can say after nearly three years of observation—purely the agricultural interest of this State. They have worked, in season and out of season, to arouse the farmers in this State to the importance of cultivating their own interests by the exchange of opinions in association, and by agricultural literature. They have not been without results in this. Pennsylvania has felt the work of this Board. In every direction there is a disposition to arouse among the farming interests to the importance of association. Professions have their associations, and trades have theirs—all branches of enterprise have by association promoted their several interests. The agricultural county fair originally had this purpose in view, the object being association and the exchange of opinions and views in that association to promote agricultural interests. This question, however, has presented itself to me, as it must have presented itself to every agriculturist and other observing citizens throughout the land, that while other professions, other trades, and other callings have reaped an advantage by association, agricultural associations have rather been retarded than advanced from that stand-point. It is a question, therefore, of inquiry, and ought to impress all our farming people throughout the land with the importance of ascertaining what the cause is of this. Do they know the importance that is to be secured by the association of other trades and other callings, and of the manufacturers' influence thereby on legislation? The trades' interests have simply to knock at the door for legislation, and the answer is made. The farming interests for, lo! these twenty years have been knocking constantly at the door, and there has been no answer. I believe that is more because of the lack of association than anything else; and, therefore, the enactment of law in the interest of agriculture has failed, and there has been a retarding movement in consequence of that almost entire lack. The purpose of this Board coming into your county is to cause additional interest in associated power.

They come also into your county with the knowledge that it is no new ground. It has been well tilled. There are very few stumps left in it. It was the first county, if I recollect aright, carved out of the original counties. It has been in organization more than one hundred and fifty years, so that as the State Board comes into session in this county it looks up with somewhat of a reverential feeling to the agricultural experience and great wealth, and the great knowledge that only comes from old age and long experience. We come also into your midst with the knowledge that Lancaster county not only has been rich in its productions of the field but in its productions of men of wide reputation, distinguished not only in the county but in the State and Nation—not only in State craft, but in law, in medicine, in invention, and in discovery. Here has been the nucleus that Pennsylvania could well point to for many, many years with pride for the development of those men of renown out of this section of the State.

This Board also comes with the knowledge that here resides the chairman of the Democratic State Committee. Whether that will have any influence upon this Board or not I am not prepared to say; but with some suggestions that you made in your address to the Board I do not think it unwise to suggest that fact. [Laughter.]

But they come, sir, to sit at the feet of the people of Lancaster county—to learn from them what the result is of these years of investigation and experience. I am satisfied that the session here will not be without fruit, and that the State Board, as it has left other sections of the State, will leave this section of the State better than when it met; and I am satisfied that the meeting of this Board in Lancaster county will leave a favorable impression upon the citizens of this county concerning agricultural interests. If we shall have accomplished that, after the warm welcome that you have extended, I shall feel, sir, that this Board was wise in surrendering to the member of the State Board from Lancaster, and that this session was held here.

On behalf of the Board, I desire again to express thanks for the kind words of welcome you have spoken.

The CHAIR named Messrs. Reeder, Barnes, and Herr a committee to receive and report upon the credentials of newly-elected members and of delegates from agricultural organizations.

On motion of Dr. ROLAND, seconded by Mr. SMITH, the Committee on Credentials were requested to present their report at the opening of the afternoon session.

On motion of Mr. OLIVER, seconded by Mr. ENGLE, the reading of the minutes of the previous meeting was dispensed with.

On behalf of the Committee on Dairy and Dairy Products, Mr. REEDER, chairman, presented the following report of work accomplished since the preceding meeting.

"Soon after the meeting of the Board in June last at Towanda, we received word from Mr. Hiester, member of the Board from Dauphin county, that a suit to test the constitutionality of the law passed at the last session of the Legislature, prohibiting the manufacture and sale of imitation butter, had been instituted by the Duquesne Oleomargarine Company of Pittsburgh, in the courts of Dauphin county, the trial to take place early in September. In pursuance of instructions received from the Board at our last meeting, namely, to coöperate with the various organizations of dairymen in the State in sustaining the law, we immediately opened a correspondence with Edwin Satterthwait, president of the "Farmers' Protective Association of Philadelphia and Adjoining Counties," A. S. Cadwallader, president of the "Bucks County Creamerymen's Association," and John I. Carter, member of the "Creamerymen's Mutual Aid Association of Chester and Lancaster Counties." Meetings of these respective organizations were called for August 6, and delegates appointed to attend a union meeting called to be held in Philadelphia August 8, 1885. At this meeting a union was effected under the title of "The Farmers', Dairymen's, and Creamerymen's Protective and Mutual Aid Association of Pennsylvania." The officers elected were: *President*, Edwin Satterthwait, of Philadelphia; *Treasurer*, Tryon Lewis, of Delaware county; *Secretary*, Eastburn Reeder, of Bucks county. A committee of six, consisting of E. Satterthwait, Tryon Lewis, A. S. Cadwallader, E. Reeder, John I. Carter, and J. H. Brosius, was appointed to collect funds, employ counsel, and take such measures as may be found necessary in sustaining the law. Several meetings of this committee have been held, and a synopsis of their work is as follows: As counsel, the services of Hon. Wayne MacVeagh, of Philadelphia, and Messrs. Hall & Jordan, of Harrisburg, were secured to assist the District Attorney of Dauphin county; committees were appointed to raise funds, witnesses subpœnaed, detectives employed, as well as experts. After various delays, the trial commenced on Friday, September 11, before the Hon. John W. Simonton, President Judge of Dauphin county, the Commonwealth being the plaintiff and Powell & Bros., of Harrisburg, defendants. Two tubs were offered in evidence containing and marked "oleomargarine butter," which had been made by the Duquesne Manufacturing Company of Pittsburgh, and sent to the Powell Bros., of Harrisburg, for sale. These were purchased by the detective and witness for the Commonwealth, whose evidence established the sale of the prohibited article. The Commonwealth then rested their case. The defense called Professor Hugo Blank, of the Pittsburgh College of Pharmacy, under whose supervision "the butter" was made, to give evidence as to its purity and wholesomeness. This was objected to by the counsel for the prosecution, upon the ground that it was irrelevant and immaterial. It was the prohibited article, and it mattered not whether it was wholesome or unwholesome. The objection was sustained, and the evidence excluded. The jury were then instructed to render a verdict of guilty and were discharged. The counsel for the defense then made a motion for arrest of judgment, upon the ground that the law was unconstitutional, and therefore null and void. This motion was argued at length by the Hon. James Gay Gordon, of Philadelphia, and Hon. Lyman D. Gilbert, of Harrisburg, for the defense, and Hon. Wayne MacVeagh, District Attorney S. J. McCarrell, and Hon. Francis Jordan for the Commonwealth."

After a partial discussion, the report was, on motion of Mr. BARNES, received and ordered printed with the proceedings.

The following notice of Hon. M. C. Beebe, (late member from Venango,) prepared by the Secretary, was read by Col. DEMMING:

Manly C. Beebe, late member of our Board, was born in the town of Fabius, Onondaga county, New York, September 6, 1827. At the age of twenty years he started to make his way in the world, and in 1847 arrived in Titusville with all of his worldly possessions in his pocket; after a short period devoted to a search for employment, he opened a school, which became very popular and numbered among its pupils many who afterwards became "men of mark in the world," among whom we may name Judge Thomas Wilson, Hon. F. W. Mitchell, of Franklin, and Hon. Samuel Q. Brown, of Philadelphia. At the close of his probation as a school teacher, he engaged in the pottery business, and soon afterwards went into partnership with Mr. Henderson in the grocery business. During this period he was elected justice of the peace, and served with signal credit for a number of years. In this capacity he was noted for his constant endeavors to induce those who called upon him in his official capacity to settle all disputes without a final appeal to court, and many were the cases which he "settled" satisfactorily to both parties, and many were the dollars which he thus saved to his clients. In 1858, he was elected county superintendent of public schools, and gave up his office without a single word of reproach as to his administration of the position. In 1867 and 1868, he served as a member of the State Legislature, representing the district composed of Mercer and Venango, and having Hon. James C. Brown as his colleague. In 1872, he was elected a member of the Constitutional Convention, in which body his counsels and advice were regarded as of importance and value by all parties. He afterwards practiced law and gave up his practice to T. A. Morrison, Esq., but after the removal of the latter, in 1879, Mr. Beebe resumed his legal duties, which he followed until a very short period before his death. In 1877, Mr. Beebe was elected by his county agricultural society to represent them in the newly-organized State Board of Agriculture. Attending the first meeting, February 1, 1877, Mr. Beebe took a prominent part in moulding the work of the organization, and is the first one of the original members who, after continuous service, has been removed by death. With the exception of our recent meeting at Towanda, Mr. Beebe never missed a meeting, and our minutes show the prominent and important part which he took in all of the proceedings of the Board; and even at the Towanda meeting, when prevented by sickness from being present, he furnished an essay upon the use of plaster as a fertilizer. In the Board, Mr. Beebe was noted for his strong and never-swerving advocacy of a State experimental station, and at every suitable time advocated the importance of such an institution to the farmers of our State. In the last conversation which the writer had with him, the day before his death, he expressed it as the one desire of his life to see such an institution firmly founded in his adopted State.

In his adopted home, Mr. Beebe was always foremost in all works of improvement, and at the time of his death held a number of prominent positions of honor and trust, among which were those of burgess of his town and director of the Second National Bank. He was the first president of the Oil Creek Valley Agricultural Society, and was prominent in the organization and management of the Venango County Agricultural Society, which he for a number of years represented in our Board.

One of Mr. Beebe's friends, in referring to him, writes as follows: "Mr. Beebe was scholarly, possessing rare intellectual attainments and sound judgment. He was a profound reasoner and an able debater. His voice was often heard from the stump during political campaigns. He was highly respected by his neighbors and friends, he took a deep interest in the prosperity of our town, and was a public-spirited citizen. He was an earnest champion of the cause of temperance, and embraced every opportunity for its advancement. He was very fond of children, and was a favorite of all the children and young people in the town. He was not a member of any church, but gave liberally to all denominations. In all of the various offices he filled he displayed talent and ability of a high order, discharging his official duties with fidelity and promptness."

Another friend writes as follows: "His influence in political movements was great, but it grew out of his acknowledged shrewdness in foreseeing the drift of popular thought and constant effort to direct it aright. Of him it can be truly said that he was never known to advocate a measure or refuse his assent to a proposition through any time-serving disposition, but was governed by his convictions of right or wrong. These convictions were strong. He was a man of opinions upon all questions, and he had the courage to express them. He was charitable towards those with whom he differed in opinion, and was one of those rare men who, living in a most eventful period of war and strife of ideas, saw clearly the circumstances and surroundings that make characters and beliefs, and gave to honest differences of creed, whether of religion or politics, the respectful consideration due among brotherhood. But while he discharged the broader duties of political life in the public places to which he was called with the exercise of most excellent judgment and common sense, and always with faith-fulness and conscientiousness, yet in the daily walk of life among his fellowmen he exhibited in no less degree the sterling qualities of his nature. He possessed in a very high degree a clear knowledge of human nature, and with great kindness of heart, with all of his aggressiveness and strong convictions, he was always a peacemaker among his neighbors. Engaged in the practice of law, and having to do with the quarrels and disputes of his fellows, it was a very bad case that he could not find some way to settle to the satisfaction of all parties without a protracted law-suit.

His death occurred at Asbury Park, New Jersey, at six o'clock, July 29, 1885, and by it our Board lost one of its most efficient members."

On motion of Mr. OLIVER, the Chair was authorized to name a committee of three members to draft resolutions expressive of the sense of the Board in reference to the death of Mr. Beebe. The CHAIR named Messrs. Oliver, Gates, and Musselman.

The committee afterwards offered the following resolutions:

WHEREAS, It has pleased an All-wise Providence to remove from us by death the Hon. Manly C. Beebe, late member from Venango.

Resolved, That we bow in submission to this dispensation of an overruling Providence, knowing that God is too wise to err and too just to afflict willingly the children of men.

Resolved, That this Board, by the death of Mr. Beebe, has lost from its membership one who was active in its organization, who has proved himself a most useful, worthy, and energetic assistant in its labors, who has enriched its councils by his extensive information upon the subject of agriculture, and who found time, amid the duties of a professional life, to advance the interests of the farm and the products of the soil, and by precept and example aided in the advancement of an intelligent and wise system of agriculture.

Resolved, That this Board recognize and appreciate the labors of Mr. Beebe in the cause with which he was identified, and mourn the loss of a co laborer, who, by his abilities and acquirements, was well fitted to aid very materially in the promotion of the best interest of our Board.

Resolved, That we hereby tender our heartfelt sympathy to the bereaved family, in this their hour of trouble.

Resolved, That as a mark of respect to the memory of Mr. Beebe, these resolutions be entered at length on the minutes of this meeting, and that a copy be sent to the family of the deceased.

Dr. J. P. BARNES, of Lehigh, moved, seconded by Mr. SMITH, of Luzerne, that the report of the committee be received and the resolutions be adopted.

The PRESIDENT having declared the resolutions open for discussion, different members bore testimony to Mr. Beebe's worth, as follows:

Dr. W. S. ROLAND, of York. Mr. President, my acquaintance with Mr. Beebe runs back to 1877, when we were both newly-elected members of this Board of Agriculture, and I feel that I could not add one word to what has been said in the obituary notice, as well as in the resolutions, if I felt inclined or disposed so to do. Mr. Beebe was a man that we were disposed, on acquaintance, to not only respect, but love, whether as a member of this Board, or as a private citizen. We respected his opinions because they were always so liberally uttered and so fairly entertained; and, as has been stated in the obituary, because he was a gentleman. He was always ready to engage in any discussion that might occur, and I believe from my knowledge of him and my acquaintance during the nine years that I have been associated with him, that he loved not only the meetings of the Board, but that he was attached to the welfare of its members.

Col. **Wm. Gates**, of Venango. As the successor of Mr. M. C. Beebe, I desire to say just a word. I had intended to give a short history of Mr. Beebe's life since he came to Venango county, but it is so fully given in the obituary notice that I think it is not necessary for me to repeat it.

In the death of Mr. Beebe, the people of Venango lost a good citizen. I was acquainted with him from 1854. He was always active in every undertaking in which he engaged. He was our first county superintendent in common schools. At that time everything was crude in the school system. Mr. Beebe took hold of the matter, receiving but a very small salary—if my recollection is right, only one hundred and fifty dollars. He traveled over that county; he urged the directors and teachers to increase the standard of education. He lived to see the day when instead of old and rackety buildings, not fit to be used for such purposes, there were substantial buildings throughout the county, and the school-terms increased from three to six and nine months. He was a progressive man in all the work that you gave him to do. He was a lover of good morals and correct ideas. He was a man that despised everything that was wrong. He despised drunkenness and crime; and perhaps was as good an example of good morals as we had in the county.

It seems to me unnecessary to take up further the time of the Board after the lengthy obituary notice that has been given. I intended to go over the same ground, but it is not necessary to do so now.

Dr. J. P. **Wickersham**, of Lancaster. If you will allow me to say a word or two—I knew Mr. Beebe for about thirty years. I knew him from the time he was elected county superintendent of Venango county, and became acquainted with him as county superintendent. At that time I was superintendent of this county. About thirty years ago, I met Mr. Beebe at a convention of county superintendents. At that time there was a period of unrest and experiment and fighting in school matters. There was a restless condition of things all over the Commonwealth, and this office of county superintendent—that has been so useful and has been the right arm of the school system—was then in jeopardy from our Legislature and elsewhere. Mr. Beebe held that office, and he was the most active, earnest, and able in the whole corps of superintendents.

I knew him as a citizen of Venango county. Later he went out of the office of county superintendent, and I went to Harrisburg; and it was my duty to travel over the State and meet the school men everywhere. I met the school men of Venango county and Crawford county, and Mr. Beebe was nearly always present. I knew him as a citizen at his own home—and the truest test of a man is his standing at home. There are a great many men who have high standing away from home, and when you come to test them there, they do not stand so high. Mr. Beebe bore that test. He was appreciated and held to be worthy by his neighbors—by those who lived around him—by those who met him in his daily walks. I say again that that is perhaps the severest test by which a man can be tried.

I knew him as a member of the Legislature, and saw him going in and out; and I think I can bear testimony that he was a man worthily there. He was against bad measures and in favor of good laws. As one gentleman has said, he was progressive. Everything for the improvement of the State, and every measure calculated to benefit it, he was on that side.

I knew him as a member of this Board. I was present when this Board was organized. Ex-officio I was a member then, and I was exceedingly glad when I noticed that he was among the earliest members. He was very active, and I think I risk notning in saying that—and no one of these gentlemen who has held positions of such eminence in this Board will feel hurt—that Mr. Beebe was—shall I say it?—the most useful member of this Board. [Applause.] There was scarcely another member who was his equal. He attended all your meetings, and his advice was always sought. He was a member of your chief committees; and, when there were legal difficulties,—and the Board often required legal remedies,—his advice was always safe and always sound. I can say, and I think the members will agree with me, that he was in his measures also always sound. He was in the prime of his manhood, and by his departure the Board has suffered a severe loss.

I was glad to hear this memorial read, and I hope this resolution will be disposed of as has been proposed.

Hon. C. C. **MUSSELMAN** of Somerset. I think I owe a word to the memory of our departed friend, Hon. M. C. Beebe. I had not intended to say anything after knowing what was in the obituary notice and resolutions; but after the remarks of Dr. Wickersham I feel like adding others.

I had the honor of being a member of the Legislature when Mr. Beebe was there, and he and I had seats close together. We often disagreed; but I always took him to be an honest and conscientious representative. As to efficiency in this Board,—he was my senior by one year, and I cannot speak from observation for that time,—but I know I express the opinion of the Board when I say that we have lost in him a very useful member; and, I may say with Dr. Wickersham, perhaps the most useful member of this Board. I know that I lost a true friend in him. What made us particular friends was that M. C. Beebe and I thought that our early history was so strikingly alike that we should be congenial.

Dr. G. W. **ATHERTON** of Centre. I do not know that the Board cares to prolong remarks upon this subject. When we came together this morning I had not observed the programme, had no thoughts on the subject, and therefore had not anything to say. But you will pardon me a single word as a comparatively new member of the Board. When I came into the Board three years ago I, knew Mr. Beebe as one of its most active members, and since my participation in the meetings one or two things have struck me with a good deal of force. The more I saw and knew of his work in the Board the more I was impressed with his characteristics; and I have been very much interested in hearing this morning from these members who have known him so much longer than others, and their testimony to his character and worth upon these prominent characteristics.

The first thing that struck me, and I think the most members of the Board, was that he was a very positive, aggressive man. He might truly have been called, without wishing to be undignified in the expression, the "fighting member of the Board." He had his opinions, for which he was willing to wage a kindly fight any time, and so came to be looked upon as rather fond of a contest. But, on the contrary, the more one saw of him the more they found that he did not enter into the contest for the sake of the contest, but simply for the sake of maintaining the views which were thought by him to be of very great importance; because his head and thought, when he reached those conclusions, which were his conclusions, were as settled as the eternal hills about him. But, with his positiveness and conviction, I never heard him in public or private utter an uncharitable word. I never heard him utter a word which misconstrued or misrepresented the position of his bitterest opponent; and with that there was a broad-minded sympathy, with all his views which he possessed, which led him to enjoy being defeated. I suppose members can recall—I can recall—

when he was voted down after a most earnest contest of some kind, in which he brought forward some of his ideas, and then he sat back in his chair with the appearance of one whose victory was coming some time, showing that whatever the result there was a conscious rectitude—that which was tied to everlasting principles. When he had got there with a subject he thought he had something to tie to, and he took that confidence with him. He had so much confidence in their true principles that he did not care much whether then adopted, because he thought his final success would be more signal and conspicuous in contrast with transient defeat; and so I came to admire that quality of character, and because it seems typical of all the American race. I say it without any feeling of exaggeration that that quality of adherence to right principles, and standing determined to go down with them, confident of ultimate triumph, it is that that makes men's lasting triumph of our race; and I shall always think of Mr. Beebe as one of the noblest representatives of that sound, manly, pure character that it has ever been my good fortune to meet. I join with the Board in regretting his loss, and in commending to ourselves that constant growth in true conduct and sound principles which he so well represented.

Dr. J. P. **EDGE** of Chester. Mr. President, I think this Board cannot better employ a part of the morning hour than in paying this tribute to our departed friend. Mr. Beebe was no ordinary man, and I have very seldom met with a man, whose character I studied to any extent, whose mental organization was so clearly expressed in the externals of the man. I think I am understood—the physiological expression indicated the mental operation to a large extent—and when he was in active controversy in this Board, it was pleasing to look at that bright flash of his eye, the firm set of his mouth, and that aggressive forward motion as a part of the expression of aggressive men. He was a character to study with profit, and to admire. Thoroughly honest, I can indorse every word that has been said in vindication of his character. He was not only honest, but especially brave in the expression of his honest convictions. The result to himself was a secondary consideration, as Dr. Atherton has indicated. Defeat was not to him defeat.

The only consolation I feel in considering this question is the fact that I find here as his successor my excellent friend Colonel Gates, whom I commend to this Board as a very excellent successor of our departed friend, however much I may regret the occasion of his coming.

J. A. **HERR** of Clinton. Mr. President, it is perhaps not becoming in me to occupy the time of the Board in extending remarks upon this subject, especially as those who have spoken have extended their thoughts so widely over the fields of action in which he was prominent. Yet a thought or two occurs that I think is worthy of mention. It occurred to me that when future generations shall review the work of this Board of Agriculture, certain individuals will stand out prominently as bright lights. Their productions will shine among the rest as the sun among the stars; and among these productions will be those of Mr. Beebe. I always admired the calm, cool confidence that he possessed. Entirely unexcitable, he could not be thrown off his guard, and I always felt that we had something to learn upon—something reliable in his ability—and that the Board of Agriculture had a champion in Mr. Beebe that it would be hard to find in any other individual. Another point that I admired was, that while among our most distinguished attorneys in the State, the railroad and other monopolies had gathered up nearly all their influence, this could not be said of Mr. Beebe. He was the champion of the people, from among the people, against the invasion of corporations, and in advocacy of the right; and his work in the Board will stand out as evidence of that.

I cannot express to you the feelings which I entertained upon receiving the news of his death. I certainly felt that, as a member of the Board of Agriculture, our loss was one that we could poorly sustain. My hope is that his example and his work may prove to us an incentive to greater and more active labor in the Board.

M. W. **OLIVER** of Crawford. Being also a successor of Mr. Beebe, I would make a few remarks, but only a few at this time. Mr. Beebe's life was certainly a bright example of what will-power can accomplish. Coming to Titusville at the age of twenty, with two five-dollar notes in his pocket—that being the sole amount of his earthly goods—he went to work and built up himself so that his closing days were his best days. Mr. Beebe was a man with whom thought always preceded work; and, having thought properly upon a subject, and placing himself right, he was ready for work, and he worked intelligently and successfully. Because of this prior thinking he was a member of great worth to this Board; and we may safely hold up his life as one worthy to be patterned after by our children and our children's children.

The **PRESIDENT**. Will the Board proceed to take action upon the resolutions at this time? It is moved and seconded that the resolutions as presented by the committee be adopted.

The question being put, the preamble and resolutions were unanimously agreed to.

M. W. **OLIVER**. I do not think it is necessary, but it will perhaps not be out of order, to move that these obituary notices be also printed in the proceedings of this meeting.

The motion was seconded by C. C. **MUSSELMAN**, and unanimously agreed to.

Under the head of new business, Mr. **REEDER** of Bucks presented the following resolutions from the Solebury Farmers' Club of Bucks County:

WHEREAS, The fence laws of the State of Pennsylvania now in operation were enacted in 1842, under conditions which have greatly changed;

AND WHEREAS, Within the last decade, wire in its different forms has come largely into use for fencing purposes, very much lessening the expense without destroying the efficiency of the fence;

AND WHEREAS, Such fences made of wire are not lawful, and render the owner liable to damages that may occur from their use; therefore,

Resolved, That Eastburn Reeder, member of the Board of Agriculture from Bucks county, be requested to bring the matter before the said Board, and urge it to have prepared a law which may meet the views of the farmers in the different sections of the State legalizing wire fences, and to urge its passage by the Legislature at its next session; and also to remodel the fence laws of the State, and make them conform more nearly to the needs of the times.

After discussion by Messrs. Atherton, Roland, Dr. Edge, Gates, Keller, and Engle, the resolution was, on motion of Dr. **ATHERTON**, referred to the Committee on Legislation, with instructions to report at a future meeting.

After discussion, it was resolved that the standing committees of last year should hold over until the annual meeting of 1886.

On motion of Mr. **ENGLE**, the standing committees were then called in regular order, when Mr. **UNDERWOOD**, on behalf of the Committee on Legislation, stated that they had nothing to report; on behalf of the Committee on Work of the Board, Dr. ATHERTON made a similar report; on behalf of the Committee on Silk and Silk Culture, Mr. BARNES made a verbal report; on behalf of the Committee on Fruit and Fruit Culture, Mr. ENGLE presented the following report:

"The report of your committee is necessarily brief from want of proper statistics to make it complete, and until a better system is adopted and carried into effect it is impossible to make a report such as our State is worthy of. We are well aware that other industries are looked upon as vastly more important than horticulture, yet if the aggregate were summed up, it would amount to more millions of dollars than a superficial view indicates. The increased, and steadily increasing, consumption of fruits must necessarily bring the importance of fruit-culture more prominent before the public—first, as a most desirable, health-giving, and health-sustaining food, and second, their commercial value.

The strawberry, the earliest fruit of the season and possibly the most delicious fruit grown, is being shipped into our large cities by dozens of carloads, besides what are grown in our State, and thence a continuous succession of other fruits to meet the strawberry again. This continuation of fresh fruits the year round is, however, largely owing to the cold-storage system, which must be considered a most important factor in keeping up the steady supply of fresh fruits. The improved system of evaporating fruits has also assumed vast proportions, and what was quite recently considered a business that could not be overdone for years to come has already fully stocked the markets and has found a foreign market besides.

The apparent uncertainty of fruits deters many from planting, but it must not be forgotten that no crop is certain, and when planters learn that it is as important to replenish the soil for the purpose of growing fruits as for field crops there will he less uncertainty of fruits, of which we have, as a rule, a feast or a famine, and have become accustomed to look for alternate and off years. The principal cause of this is over-bearing, which enfeebles the tree, and, a severe winter following, it is often severely injured or killed; if it survives, it requires a year or more to recuperate. How common to see in a plentiful season branches of fruit-trees propped, to prevent their breaking down with their load. To the judicious fruit-grower this seems folly, since he resorts to relieving his trees of their surplus so as to require no propping. By this method he secures a more valuable crop and does not overwork his trees. In this case vegetable and animal life are similar, and who would for a moment think of propping up his horse should he find him overloaded? Would he not rather unload? The increase of injurious insects is another serious obstacle to fruit-culture, but, with the advanced methods of counteracting and destroying them, very much can be done to stay their ravages. Vigilance, however, must be the watchword.

Diseases of fungoid and other growths are a very formidable obstacle to fruit-culture, *i. e.*, blight in pear, apple, and quince, rot and mildew on grapes, rust in raspberries and blackberries, and yellows in peaches constitute some of the serious obstacles to fruit-growing, all of which are more easily managed than the latter.

Investigations by practical and scientific men, however, promise results which give the orchardist control of yellows, as well as of other diseases of trees. A law similar to that of Michigan, requiring the eradication of all diseased peach trees, would go a great way toward staying the spread of yellows. The deliciousness and value of the peach should stimulate extraordinary exertions to save the trees, not only from destruction, but also to keep them in healthy condition.

With the multiplication of new varieties of fruits annually, and the adding of many of them to our fruit list, we may reasonably hope that in the near future we shall have all that the most progressive grower and most fastidious consumer may desire.

Nut-culture has never received the attention it deserves, especially chestnuts, which, when fresh, being boiled, baked, or roasted, will make as delicious a morsel as can be found, and very nutritious besides. With the new improved varieties planted in soil that can hardly be cultivated, or any light soil of the lowest value, can be made to produce crops of more value than others that may require the highest-priced land.

A word to the wise will suffice."

On motion of Dr. BARNES, Dr. Roland, chairman of Committee on Forestry, was excused from making any report, and the Committees on Apiary and Bee Culture, Useful Birds, Cereal Crops, Roads, and on Wool and Textile Fabrics, presented no reports.

On motion of Dr. ROLAND, seconded by Mr. FORESMAN, the subject of holding another meeting of the Board before the regular annual meeting was referred to the Executive Committee.

On motion, the Chair was authorized to fill all the vacancies in the several committees.

On motion, adjourned.

WEDNESDAY AFTERNOON, *September 30, 1885.*

Mr. REEDER, on behalf of the Committee on Credentials, reported as follows:

"Credentials have been presented from the following societies: Venango County Agricultural Society sends credentials of William Gates to fill the unexpired term of M. C. Beebe, deceased. Clarion County Agricultural Society sends credentials of John F. Brown, and the Chester County Agricultural Society sends as delegates Alfred Sharpless and Samuel Walters.

"After examination of the foregoing credentials, we recommend that John F. Brown of Clarion county be admitted to membership in the Board for the term of three years, from the fourth Wednesday in January, 1885, and that William Gates of Venango county be admitted to membership in the Board to fill the unexpired term of the late M. C. Beebe, terminating the fourth Wednesday in January, 1886. And that Alfred Sharpless and Samuel Walters be accredited as delegates from the Chester County Agricultural Society."

On motion of Mr. KELLER, the report of the committee was adopted and the committee discharged.

The CHAIR announced that he had added the name of William Gates to all committees of which the late M. C. Beebe had been a member; the name of Victor E. Piollet on all of which Leonard Rhone, resigned, had been a member, and H. M. Wise in place of John Dindinger on all committees of which the latter had been a member.

On behalf of the Executive Committee, the SECRETARY reported that they had decided to recommend the holding of another general meeting of the Board previous to the annual meeting; the report having been adopted by the Board, CHANDLEE EVES, on behalf of the Columbia County Agricultural Society, invited the Board to hold its next meeting at Bloomsburg. After discussion, the invitation was adopted, and the time of the meeting referred to a committee composed of the resident member and the Secretary of the Board.

Mr. **WILSON** of Juniata then read an essay on "Red Clover; its Value as a Fertilizer, and How to Secure a Good Crop." The subject-matter of the essay was discussed by Messrs. Cochran, Oliver, Wilson, Keller, and Engle, when, on motion of Mr. **SMITH**, seconded by Mr. **KELLER**, the discussion was closed.

Dr. **ELWOOD HARVEY** of Delaware then addressed the meeting on "The Horse and His Treatment," and was followed by a discussion of the topic by Messrs. Barnes, Zerr, Musselman, Wilson, Eby, Smith and Keller.

On motion of Mr. **ENGLE**, S. P. **EBY** of Lancaster then read an essay on "Forestry and its Effects upon the Farmer," which caused discussion by Messrs. Harvey, Smith, Oliver, Gates, Eby, Musselman, Foresman, Wilson, Young, Eves, Keller and Secretary.

The hour of adjournment having arrived, the next essay was deferred until the next session, and, on motion of Mr. **FREDERICK**, adjourned.

WEDNESDAY EVENING, *September 30, 1885.*

Board called to order at 8, P. M., by Gov. R. E. **PATTISON** in the chair.

The **PRESIDENT** announced that Dr. H. Leffmann, Microscopist of the Board and lecturer for the evening, had been prevented from attending by sickness, and that Dr. Elwood Harvey had consented to address the meeting on the subject of "Geology", and that the Executive Committee had decided to make the change in the programme.

The address of Dr. Harvey was listened to with more than usual attention until the regular hour of adjournment, when, on motion of Mr. **SMITH**, the Board adjourned.

THURSDAY MORNING, *October 1, 1885.*

Board called to order at 9, A. M., by Gov. R. E. **PATTISON** in the chair.

Mr. **OLIVER**, on behalf of the Pennsylvania State Dairymen's Association, invited the Board to send delegates to the annual meeting of that body. After discussion, the Chair was, on motion of Mr. **REEDER**, seconded by Mr. **SMITH**, authorized to name three delegates to attend the meeting.

On motion of the **SECRETARY**, the Committee on Work of the Board was instructed to examine the list of the standing committees, (other than the Executive and Advisory Committees,) and, if thought best, to report to the next meeting changes in the subjects to be considered by these committees, the report to be made previous to or at the annual meeting.

On motion of Mr. **REEDER**, this committee was instructed to add a Committee on Fences and Fence Laws to the list of standing committees.

Mr. **HIESTER** of Dauphin then read an essay on "Celery Culture and its Profits," which was followed by a discussion of the topic by Messrs. Engle, Wilson, Herr, Reeder, Roland, Zerr, Carter, Harvey and Smith.

On motion of Mr. **SHIMER**, Mr. **REEDER** of Bucks then read an essay on "The Constitutionality of the Oleomargarine Law of 1885," and was followed by discussion by Messrs. Cochran, Harvey, Roland, Reeder, Oliver, Wilson, Herr, Engle and Secretary.

The essay of Mr. Oliver of Crawford (as per programme,) was then called for by the Chair, when Mr. **OLIVER** stated that he had changed the title as allotted to him and proposed to read an essay on "How Success is Achieved." After the reading of Captain Oliver's essay, **CASPER HILLER** of Lancaster read an essay on "Lime and its Effects." The subject having been declared open for discussion, Messrs. Cochran, Harvey, Baker, Musselman, Gates, Zerr, Hiller, Whitmer, Hiester, Engle, Miller, Andrews, and Secretary gave the result of experience in the use of lime.

J. P. **EDGE** of Chester being unavoidably absent, essay No. 3 of the programme was deferred until the session of the afternoon.

THURSDAY AFTERNOON, *October 1, 1885.*

Board called to order at 2, P. M., by Gov. R. E. **PATTISON** in the chair.

Hon. J. Simpson Africa, Secretary of Internal Affairs, having been prevented from attending on account of illness in his family, Mr. F. **HALL**, of the Department of Internal Affairs, read an essay entitled "Glimpses of Lancaster County," prepared by Mr. Africa.

Prof. C. B. **COCHRAN**, Microscopist of the Board, then addressed the meeting upon the subject of microscopic examination of the cereals.

On motion, **JOHN I. CARTER** of Chester county read an essay in answer to the question "Will Better Farming Pay?" which was followed by a discussion in which Messrs. Baker, Black, Engle, Wilson, Zerr, Carter, Oliver, Foresman, Gates, and His Excellency Gov. Pattison participated. By request, **THOMAS BAKER** of Lancaster county then read an essay upon "The Relation of Capital to Labor."

On motion of Mr. **HIESTER**, a vote of thanks was accorded to the Lancaster County Agricultural Society, to Dr. J. P. Wickersham, to the commissioners of the county, and to the Honorable Judge of the court for courtesies extended to the Board.

On motion, adjourned to meet at Bloomsburg at the call of the Advisory Committee.

EXTRACTS FROM THE REPORT OF THE SECRETARY.

THE CROPS OF 1885.

The increased amount of labor entailed, coupled with a limited appropriation for office expenses, has compelled us to omit much of the work of collecting statistics relating to the crops and live stock of the State; it is, however, proposed to re-organize the corps of crop and stock reporters during the coming year, and to utilize our slightly increased appropriation in this way. In this re-organization the reporters will, as far as possible, be scattered over the whole territory, and regular quarterly reports will be made of the condition of the crops and live stock.

The agricultural balance-sheet for 1885 is not one which is very favorable to the farmer, or which would have a tendency to cause the investment of floating capital in the occupation as a means of profit. Prices have been low, and in some cases the crops have been below the average; in all cases, the margin between the market price and cost of the crop has been small, and when the exhaustion of the soil is taken into consideration, is often entirely absorbed. The returns of our reporters during several years past would seem to indicate that when interest upon capital, taxes, &c., are taken into consideration, a bushel of wheat cannot (under average cultivation) be produced in Pennsylvania for less than eighty-five cents; as many sold their entire crop for ninety to ninety-five cents, the correctness of the above argument at once becomes apparent. If our data is correct, (and it is the result of the careful average calculations of a large number of practical men,) selling wheat at ninety cents per bushel is a losing speculation for the Pennsylvania farmer. On the other hand, it may be argued that the products of the farm are no lower in proportion than those of any other trade or business, and that capital invested in agriculture pays as great an interest as that in any other business. It is true that farmers are working upon a very small margin, but it is also true that many other callings are prosecuted at a loss. The causes which produce this condition of affairs are many and difficult to fully understand. Of them all, that of ruinous competition with the lower-priced lands of the West is probably the most prominent. Farm products produced upon land worth one hundred dollars per acre command very little more at the seashore than similar products produced upon Western land costing but twenty-five dollars per acre. The difference upon the capital invested, forms a very important integer in the balance-sheet; this is also supplemented by the fact that, without expensive commercial fertilizers the lands of the West will produce

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During the year, a large amount of information, resulting from the correspondence of the Board, accumulates in the office. An attempt has been made to consolidate this information and place it in a form which shall be available to the general reader. The limited space allotted by law to the annual report of the Board precludes the insertion of more than a small portion of this material. The reader will, therefore, bear in mind the fact that these extracts were written at different times and under different circumstances, and are published in a form which prevents any successful attempt to give them a regular connection, as would have been the case had the whole report been published.

large crops. When to these two we add the fact that the Western grain is put down at tide-water at rates of freight which paralyze Eastern competition, we have probably summed up the prime causes of the agricultural difficulty to which we have alluded. If Western grain had to pay a rate of freight per hundred miles equal to that now charged Pennsylvania grain for one tenth the distance, we would have an alteration in our farm balance-sheets which would place a different phase upon the whole question and do much to answer the question of "Does grain-raising pay in Pennsylvania?"

So far as can now be seen, we can look to but two outlets for escape; we must increase the yield without increasing the cost, or else increase the demand without increasing the crop. The latter of these seems to be beyond our power, and hence it would seem that our efforts must be in the direction of decreasing the cost per bushel by increasing the crop in a greater ratio than its cost. How to do this is not so evident; can we, by the more liberal use of commercial fertilizers, increase the yield without too much increasing the cost? Some of our best practical farmers will unhesitatingly give a negative answer to this question; some will claim that the use of this means will produce a result exactly the opposite of that aimed at, and that instead of decreasing the cost per bushel, will increase it; to this others will object and thus leave the question undecided. For our own stand-point we would assume that the present amount of commercial manure used, may be doubled and still yield a greater per cent. upon the investment, or, in other words, will produce an increase in the crop which will cost less per bushel than that which we now produce.

In addition to the use of a greater amount of fertilizers we may cheaply increase our crops by more care in the preparation of the soil and in seeding. If one dollar's worth of labor will increase the crop two bushels of wheat (or its equivalent in any other crop) per acre, the investment, from a business point of view, is a good one; that in nine cases out of ten this can be done, is, we think, apparent. The increase named is small and the labor needed easily obtained upon reasonable terms; who will make the experiment and report the result? Can any tell what is the maximum amount of expense per acre that can *profitably* be expended upon wheat? How much of the crop is lost by too early seeding? How much by careless harvesting? How much from rats and mice in the mow and granary? How much can the corn crop of the State be increased by the more careful selection of seed, so that the loss from absence of plants shall be reduced to a minimum? How great a proportion of this crop is lost from a failure in the sprouting of the seed? In our travels we have noted fields where the loss from this cause alone was twenty-five per cent. of the crop, and where two or three dollars spent specially in the selection of the seed would have paid a hundredfold in the yield of the crop. It is scarcely too much to say that the corn crop alone in Pennsylvania, suffers a loss of fifteen per cent. from bad seed; how much is lost from other causes? And how much may be added to it by a more careful system which shall exclude all losses, or, at least, reduce all to the minimum?

The Wheat Crop.

There are few States in the Union in which it is more difficult to arrive at an idea of the *average* crop than ours. We have, by a difference in elevation, all the extremes of latitude. In our rich, fertile valleys we can attain a yield of thirty bushels per acre, and even in such an unfavorable year as the past, such crops are matters of record; and yet the average crop of the

State is not much (if any) more than nine bushels per acre. Many fields were plowed down early in the spring and others were not worth harvesting. Many did not yield the seed sown, while others paid well; nor was this difference attributable to errors of management or variation in latitude. In the same locality, and apparently under almost the same circumstances, these variations were found side by side; a slight difference in the location of the field, with reference to exposure, made a difference of ten or more bushels per acre. In one case, during windy weather, the crop was sheltered by snow which, in the other case, was blown off; some fields "winter killed," until they were scarcely worth cutting, and this, too, after careful preparation and liberal manuring. The fields which were fortunate to come through the winter all right gave good yield; and, if there was any profit, their owners made money out of wheat. In large areas in different portions of the State, the soil was so dry at seeding time (in the autumn of 1884,) that the ground was but imperfectly prepared and much of the seed failed to sprout from this cause alone. In many cases this was still further increased by prolonged dry weather after seeding. In a number of cases the crop was injured by high and drying winds at a time when the ground was unprotected by snow; in a few cases, (much less in number than usual,) injury was done to the crop by sudden changes of temperature which, by the expansion and contraction of the soil, injured the plants.

From the best data attainable, we estimate the wheat crop of 1885 at thirteen million five hundred thousand bushels, produced from one million five hundred thousand acres, or at the average rate of nine bushels per acre, this, of course, taking into consideration the whole area originally planted. If we exclude that portion plowed up or not harvested, we would probably increase the actual yield to ten bushels per acre. Knowing about the cost of preparing an acre for wheat, the reader can from his own experience furnish an answer to the question, "Does it pay to raise wheat in Pennsylvania?"

The future outlook for this crop is not encouraging. Our only reliance is upon a foreign market. In this we have the active competition of Russia and Western Europe and the rapidly-growing competition of India. This latter competitor has been kept back by the want of facilities for transporting the crop from the interior to the sea-board, but the parent government, being herself a large purchaser, is rapidly furnishing capital for the needed railroads, and each harvest makes the competition still closer and narrows the margin of profit. The cost of producing a bushel of wheat in India is considerable below that expended by the Ohio farmer and still further below that of the Pennsylvania farmer, and the time is probably not far distant when the farmers of our Western States, with land decreasing in fertility, will find themselves very much in the same position with reference to India wheat as does the Eastern farmer with the product of the West. The outbreak of a war in Western Europe would sooner or later involve all the wheat-growing countries, and would not only remove them as competitors, but would also increase the demand for our grain. This, however, is an integer upon which we cannot calculate with any degree of certainty and which cannot affect the solution of our question beyond its continuance.

The Corn Crop.

Our reports relating to this crop lead us to estimate the crop of 1885 at about five per cent. less than the average of the past ten years. Taking this average as forty million seven hundred and fifty thousand bushels, we have the yield of 1885 at about thirty-eight million seven hundred and fifty thousand bushels. The average is a slight increase on that of the past ten years, and may be estimated at about one million two hundred and seventy-five thousand acres, thus giving us an average yield of about thirty-three and one third bushels. The crop, like that of wheat, exhibited variations which were difficult to account for. In some sections a large percentage of loss arose from the failure of the seed to sprout properly; the early cold weather of the preceding fall injured the seed germ before the cob was sufficiently dry to absorb the surplus moisture of the grain. Where proper care had been taken of the seed, a full stand was secured and the yield per acre has been much better than was expected from the appearance of the stalks and fodder. In many cases, this supposed yield will be still further increased by the depth of the grain and the decreased size of the cob. In some portions of the State, the yield was much decreased by dry weather at the time the ears were forming or when the grain was filling up, and much injury was done by these two causes combined. In the eastern portions of the State, the stalk was much shortened by dry weather early in the season, but moist weather at earing time caused the production of ears which, in the yield of grain, surprised the grower. When the whole crop has been shelled we think it will be found that the yield resulting from the increase of the proportion of grain to the cob will materially increase the estimates of many of our reporters.

The Oat Crop.

The average acreage of this crop is but little below that of the corn crop, and may be placed at one million one hundred and fifty thousand acres, which the past year gave an average yield of twenty-nine bushels by measure. From this data we estimate this crop at thirty-three million three hundred and fifty thousand bushels, or about four hundred thousand bushels below the average of the past ten years. This reduction, which weight is taken into consideration, was mainly due to dry weather at the time when the grain was in the milky stage, and which prevented it from filling out. Much of the crop falls considerably below the standard and below the average weight per bushel. A certain proportion of the loss might have been prevented by a more careful selection of the seed and by a more careful preparation of the soil. In too many cases our farmers seem to think that this is an unimportant and unprofitable crop, and one which will not repay them for an outlay in labor and fertilizers; but we think that a careful test will convince any one that it will richly repay both. In calculating its cost, we too frequently fail to credit it with the short space of time during which it occupies the ground. In our dairy districts, many consider the crop a sort of necessary nuisance which they must tolerate as a portion of the rotation necessary to get the ground again seeded with grass. That the crop will well repay greater care is evident to any one who will give it a test, and will furnish but another confirmation of the motto, "What is worth doing at all is worth doing well." As far as rereported, all experiments by sowing grass seed with this crop have resulted unsatisfactorily. In a few cases a good stand was secured, but as a rule the experiment was not such as will lead to its repetition by the same grower.

Potatoes.

During the past ten years, we have probably had no season in which the yield of this crop varied so much, or in which it was more difficult to arrive at an approximate estimate of the average yield. In many cases, a difference of a week or more in the time of planting caused a difference of fifty per cent. in the yield of the crop. In adjoining fields, in which culture, varieties, manuring, and treatment was apparently the same the yield differed fully sixty per cent. Crops planted at a time when dry weather prevented the proper growth of the tuber were shortened in their yield, while others, planted a few weeks earlier or later, perfected a large crop. Other crops which promised fair yields were injured by second growth before they were dug, and as a result yielded rough and unmarketable tubers. In many sections the percentage of small or unmarketable potatoes is unusually large, and will materially reduce the crop for consumption and market. In a few cases, more than an average percentage was lost from rot; but as a rule the crop of the State was put into the cellar without any material loss from this source. We estimate the crop at seventy-five per cent. of the average one of the past ten years; but even this involves the marketing of potatoes which, during years of large yields, would be retained as stock food.

INVESTIGATION OF DISEASES OF LIVE STOCK.

The amount placed at the disposal of the Board for the special purpose of investigating diseases among live stock has been strictly applied to the purposes of the appropriation, and as far as possible, all unusual outbreaks of disease have been investigated. In many cases our prompt investigation has prevented a local panic, with its disastrous results. In several cases a single investigation, at a cost of a few dollars, has set at rest the fears of a whole neighborhood and saved many dollars in expensive treatment and surgeons' fees.

During the last year, we have been called upon to investigate three cases of loss of cows and steers, which was clearly due to improper feeding, as was proven by the fact that a change of feed produced immediate relief and exemption from further loss. In one case we were called on to examine a fine herd of grade and improved stock of different ages, from which six animals had been lost by an apparently complicated lung or stomach trouble, and seven more were suffering with the premonitory symptoms. A critical examination by Dr. Bridge satisfied him that the trouble originated in the stomach, and that the effect on the lungs was but secondary. A post mortem revealed an impacted stomach and a degree of inflammation, which had so injured its structure that it had become completely disorganized and so much weakened that the linings could be peeled off by the slightest touch. It was found that each of the six that had been lost had suffered with exactly the same symptoms, and that a certain number, which had been fed rough provender in the yard and had not been stabled at all, had not suffered from the trouble. An investigation into the mode of feeding demonstrated that the only difference, beside stabling of the diseased animals, was that they had been fed quite liberal upon corn ground down with the cob, and not finely ground. An examination of the feed-chest, as well as the stomach, of the dead animal, exhibited large flakes of the cob, which in the feed-chest had edges as sharp as a knife blade, and which needed but a little pressure with a slight lateral motion to penetrate the skin as would a piece of glass. The fact that none of the animals which were kept on rough fodder and without the cob meal were affected should have (but did not) directed the owner's attention to the cause. This and several other cases which have come to the notice of the writer during official examinations of other herds have clearly demonstrated the fact that during early spring, corn cob meal, unless very finely ground, is dangerous as a stock food, and should be discarded entirely; this is especially the case when ground in horse-power mills. In another case of a fine herd afflicted with tuberculosis, the disease was greatly aggravated (if not caused) by the fact of the animals inhaling, while coughing, the particles of cob in the meal. One animal was found by post mortem to have a considerable number of these irritating particles in his lungs and respiratory tubes, each one the center of violent local inflammation. In both of the cases alluded to, a change of food removed the difficulty, and while one of the animals died, none of the others were afterwards affected, and the owner was thoroughly satisfied that the cob meal was in the first case the cause of the difficulty, and in the second greatly aggravated an already existing lung trouble.

Our investigations prove beyond all doubt that glanders among horses and mules is greatly on the increase in all portions of our State, but more particularly along and near to the lines of our canals. Many of the sales and exchange stables (principally for a lower grade of animals) in our larger cities are poisoned with the discharges from diseased animals, and from this source others are poisoned. Many of the animals used along the towpaths of our canals come from these stables, and the use to which they are put is well calculated to spread the disease. Sooner or later self-protection will lead to the enactment of stringent laws providing for the destruction of all infected animals, and in this Pennsylvania is now behind a number of her sister-States, where laws of this kind are in force solely with the object of protecting the public and not for the relief of the owners of diseased animals. The number of States having such laws is each year increasing, and a few more years of such experience as the past three or four will force the matter upon the attention of our Legislature.

In accordance with the experience of each year since the formation of the Board, we have to report more or less loss from outbreaks of Texan, Spleenic, or Southern cattle-fever. Heretofore we have only had what might be styled a secondary outbreak to contend with, but during the past autumn an outbreak was reported at Erie, which differed somewhat in its nature and in the extent of the danger from any coming under our notice since the organization of the Board.

This disease, though properly styled a contagious one, has a peculiarity common to no other known disease, and which saves the Pennsylvania stock-breeder from by far the greater portion of loss which would otherwise result from each and every outbreak. The Texan or Southern steer, though showing no signs of being infected, will infect every Northern animal which comes in contact with any of the secretions from his body, but this infected Northern animal has not the power to infect others. With the one infection by the Southern animal the difficulty stops at once ; hence in ordinary outbreaks, such as we have heretofore reported, where none but infected Northern stock were introduced into the State, our labor was confined to mitigating the condition of the sick and no care was needed for the others of the herd. The outbreak at Erie was, however, of a different nature, and appears to have been caused by the introduction of the Southern animals themselves. This, of course, involved the infection of all native animals which came in contact with them or their excretia. As the outbreak did not occur until the Southern animals had pastured with or been followed by a number of natives, the outbreak was much more extended than those noted previously. But little can (in any case) be done for the stock (native) actually affected, and as prompt measures were at once taken to prevent any further infection directly from the Southern stock, the outbreak was soon checked and the danger averted.

Another out break investigated near Lewisburg was due to the introduction of a lot of Northern (Ohio, probably,) cattle that in some way or other (probably in the cars) were infected by Southern animals. Several were lost, but the investigation explained the nature of the disease, quieted the alarm and restored quiet among neighboring stock-owners. Two other and similar cases were reported, and all the relief possible, under the circumstances, was afforded. We cannot too strongly urge upon the National Government the propriety of preventing the passage of these Southern animals North of a certain fixed latitude, after a certain date in the spring and before a certain date in the autumn. A good sharp frost destroys the virus of the disease and deprives it of its power of infection; and, hence, if the dangerous stock are not moved North after a frost in the spring, or before one in the autumn, the danger will be averted and no loss ensue. Western stock-owners appreciate the position much more clearly than do those of our State, (probably because they experience the danger much more frequently,) and have demanded the enactment of State laws governing the movements of such stock. In a number of cases, where neither State or Nation has afforded the necessary protection, the people have taken the law in their own hands and have protected their cattle ranges with shot-guns.

The investigations, under a special act, of real and supposed cases of contagious pleuro-pneumonia have plainly developed the fact that tuberculosis (tubercular consumption) is rapidly increasing among the dairy stock of the State, and that since 1879 the number of cases has been fearfully increased. In a number of cases the owners of valuable herds of thoroughbred stock have aided in the work of spreading this disease by the sale of breeding animals to unsuspecting purchasers. As the disease is not only contagious but also hereditary, and when introduced by hereditary taint becomes contagious, we would urge that steps be taken to prevent the practice. The danger from the uninterrupted progress of this disease is greatly increased by the fact that it may be communicated to the human race by milk or improperly cooked flesh, which may be diseased. It may also be communicated to man by the ordinary means of conveying diseases of a contagious nature.

Several outbreaks of hog cholera have been reported, but as very little can be done towards mitigating the loss and danger, it was thought best to devote our energies and resources into channels which promised more hope of success and benefit to the public. Of this disease we have little new to report, and no developments have been made since our last report. A majority of the outbreaks in our State are traceable to the unloading of the carcasses of animals dying with the disease while being transported from the West, where they were infected; but few cases have been reported which were traceable directly to the purchase of infected animals. A number of patented mixtures, advertised as certain cures, have been tried, but thus far nothing effectual has been reported and nothing can be recommended which has not been previously reported.

Our investigations have more than ever shown the pressing need for well-educated veterinary surgeons in many portions of the State. While there has been a wonderful improvement within the past ten or fifteen years, and while the "cow doctor" has in many cases disappeared before the coming of the skilled veterinarian with his diploma, yet there is vast room for further improvements in this respect, and we note with much pleasure the establishment of a department of veterinary surgery at the University of Pennsylvania, under the care of practical veterinarians. The rapid increase not only in the numbers, but also in the value of our farm stock, will absorb for years to come all assistance which can be afforded by several colleges, and there is but little doubt that the demand will grow faster than the supply from all present sources.

COUNTY AGRICULTURAL SOCIETIES.

The past season has been one of varied success with the exhibitions of our county agricultural societies, but in the average summing up it must be admitted that a smaller number have achieved success than for several years past; in fact, a number of these organizations in all portions of the State are handicapped with debts, which have received another accession from the results of the exhibitions of the past autumn. In some cases this want of patronage was due to bad weather during the fair; all were more or less affected by the stagnation in business, which rendered the halves and quarters less plentiful; some in the south-eastern portion of the State were more or less interfered with by the exhibition of the State Agricultural Society, held at the same time, and others attribute their result to dissensions among the managers and stockholders. Admitting the average partial failure, it may be well to examine into the possible causes, in order that, if possible, they may be guarded against in the future. We think a review of the whole situation will convince those not interested that one prominent cause of many of the failures has been the over-preponderance of free admissions. In many cases a small payment makes stockholders for life of heads of large families whose members, as well as many who are not members, are admitted to all exhibitions free; another class are the exhibitors, who, by the payment of a small sum, obtain tickets, which admit them at all times during the fair, a privilege which is too often abused and transferred to others. We could give instances where the entry of a single article, not worth of itself fifty cents, has entitled the exhibitor to privileges, which, even if not abused, were worth three or four times that amount. There is scarcely a single fair in the State, which, the weather being good, would not pay all expenses, provided every one entering had paid the full admission fee; and we know of exhibitions at which we were assured, by those in a position to know, that fully fifty per cent. paid no admission fee at all, or if any was paid it was done in such an indirect way as to confer no benefit at all. When a private enterprise is found to be unprofitable, the first move toward rectifying the difficulty is in the direction of reducing running expenses; and we may certainly claim that free admission is, in so far as it decreases the receipts, chargeable to running expense accounts. We could instance a society in the State burdened by a heavy debt, until spring exhibitions entailed a heavy loss upon the management and were finally given up as unprofitable. At the suggestions of some of the managers, the experiment of holding spring exhibitions, at which all should pay the admission fee, with no free or stockholders' tickets, the managers to guarantee the society against all loss, was tried in each case with a margin on the profit side of the account. The same principle will hold good with fall exhibitions, at which all pay the admission fee. Some claim that the stockholders are entitled to the interest upon the value of their stock, and so they are, but in a stock company which formerly admitted the stockholders' families in addition to the stockholder himself, some obtained fifty per cent. interest each exhibition. What organization is able long to stand such a leak, and with these privileges and a heavy interest to pay, can we wonder that so many of our county agricultural societies fail in point of profitable returns? The remedy for this is to limit the privileges of the stockholder, so that they shall be equivalent to but a fair rate of interest upon his investment. Give him free admission for himself and whatever number of ordinary admission tickets he may, by the decision of the managers, be entitled to. These he may use as he chooses, either to admit the members of his family or sell them to others. If, as an instance, we take a society whose admission fee is fifty cents and whose stock sells for ten dollars per share, two admissions is here equivalent to ten per cent. per annum upon the investment and is quite as much as any business organization can afford to pay; if, after two admissions for himself, each one pays the full admission fee, it will transfer the balance to the other side of the account of seventy-five per cent. of the debt-laden organizations of our State; it at the same time gives the stockholder a fair rate of interest upon the investment.

Experience and observation convince us that many of the internal dissensions which so much interfere with the financial success of these organizations is caused by the present system of appointing the judges. In most cases a list of judges is named to be present at a certain hour on a named day. They are seldom present and an unauthorized chairman proceeds to fill vacancies on his committee as per the schedule, and the error, which afterwards causes so much trouble and hard-feeling, is committed. Instead of this, let competent judges be selected outside of the county; pay their expenses and avoid nine tenths of the ill-feeling which nearly always follows the awards of local judges. This may be objected to on the plea that it would involve the expenditure of some money; but we could instance exhibitions which have been almost financially wrecked by bad feeling resulting from awards made at the exhibition of the previous year. These exhibitions should be conducted in a business way; and if the expenditure of one hundred dollars will pay, then, from a business standpoint, it is all right.

At an exhibition during the past fall, at which the writer was present, the question of retrenchment came up and a number claimed that the premiums to trotting horses should be cut down, and that this was the point at which economy should commence. At the close of this exhibition, which was unusually successful, the fact was developed that the entrance fees on trotting horses, added to the receipts of the track-stand, had paid all of the trotting premiums and two hundred and eighty dollars more, with no account taken of the increase in admission fees at the gate. In this case, which is the gauge of many others, the defect was elsewhere than in the premium list. It would be safe to estimate those who paid no cash entrance fee at the gate at twenty per cent. of the whole number in attendance. We know from experience what the claims of stockholders are; how persistently they are urged; how great the drawback of stockholders or free tickets is to the managers; and we can estimate the gain in dollars and cents to the latter, between admitting every stockholder and his family free, and paying him ten per cent. on his investment. And we do not think that there is a board of managers in the State who will not bear us out in the statement that the cost of this plan of paying interest upon a debt more nearly approaches twenty-five per cent. in the aggregate.

Aside from the question of admissions, the most prominent one coming before the managers of these organizations is styled the "Horse Question," a subject which annually causes no little discussion and ill-feeling, and which often forms no unimportant item in the success or failure of an exhibition. While we may have decided views upon this question, our experience as a manager of a county agricultural society leads us to take the conservative ground that the board of managers, being elected by the stockholders, may be taken as representing the wishes of the latter, and if a majority of those voting decide that they will have no trials of speed it is carried out by the board; if, on the other hand, neither party can elect more than a portion of the board, it seems but fair that each division should work for and represent the wishes of those who elected them. The question of trials of speed, within certain limits, seems to be one of opinion, and both opinions among the voters have the right of representation in the board; and both representations in the board are in duty bound to carry out, as far as is possible and just, the wishes of those who elected them. After the election all difference should be dropped and all work together for the general good of the organization. Any vicious opposition to the wish of the majority, as shown by the election, is improper and will hardly be tolerated by any fair-minded man. Any one who will not accede to the will of the majority should not accept a position upon the board of managers; he must work for the general good or he is clearly out of place there.

SELECTION OF FERTILIZERS.

In the selection of fertilizers there are a few important points which should always be kept in view. *First*—That the time during which a fertilizer may act upon the crop is an important item governing its selection; a crop of wheat may require and utilize a fertilizer which would not prove economical if applied to corn. One has ten months in which to produce its action while the other is practically limited to four; one is certain at some time during the growth of the crop to have sufficient moisture to release its more soluble portions, while the other may not get sufficient water to render it of much service; one can economically use a slow-acting fertilizer, while the other can only be increased by one which acts rapidly and is readily soluble. Thus the same amount of money expended in fertilizers may affect the crops very differently, and this difference may cover all the margin between loss and gain. A fertilizer which exhausts itself in the formation of straw, while it may add to the bulk of the manure-pile, assists very little in the formation and increase of the grain. In many cases the manured and unmanured portions of the field may, to the naked eye, show little difference, while in reality the heads of the former will, on close examination, show two extra rows of grain over a portion of their length, a difference which tells in the half bushel, but which may not show in the field.

From this we may infer that guano, alkaline salts, and such fertilizers as are rich in soluble phosphoric acid will best suit the needs of spring crops, and that slower-acting fertilizers will produce the best results with wheat; that ground bone will give the best results on crops having the longest period of growth. That, conditions and crops being equal, the greater the percentage of the desired ingredient in the fertilizer, the cheaper it is to the consumer, for, by the concentration, both freight and handling are saved. If potash is the desired ingredient and no other is wanted, the reader will find the two extremes of articles producing it in the muriate of potash (No. 49) and marl from Maryland, (No. 224,) the former containing one thousand and seventy-four pounds per ton and the latter but six and one half; the former furnishing it at a cost of less than four and one half cents per pound and in the latter costing more than one dollar and a half per pound. He will find the extremes of available phosphoric acid in any of the high-grade dissolved South Carolina rocks, where it will cost less than nine cents per pound to No. 60, in which it will cost five times as much. The extremes of the cost of ammonia will be quite as great. In fact, a careful examination of our table will show that, as a rule, the higher the grade of the goods the lower the *cost per pound* of the ingredient needed, and that, having made up his mind as to the exact nature of the fertilizer to be purchased, it is more profitable to obtain a small weight of a really good article than a larger bulk of a poorer one. Having decided that acidulated South Carolina rock is the fertilizer that he should use, the consumer should then buy the highest grade he can get, having in view the amount available by the use of acid. The same argument may be applied to other ingredients (potash and nitrogen) with the same force, but it will not do to compare an acidulated South Carolina rock with muriate of potash or with a complete fertilizer—each class should be compared with members of its own class only. Ammoniacal salts, costing fifty dollars per ton, should not be compared with acidulated South Carolina rock, costing but seventeen dollars; one furnishes nothing but potash, and as a source of this ingredient may be economical, while the other furnishes nothing but phosphoric acid. We have endeavored to assist the consumer in his comparison of fertilizers by their values by placing the "complete fertilizers" in a list by themselves, and, except as to one or two articles, the figures in this list may be compared with each other. Wood-ashes, as a source of potash, may be compared with muriate of potash, and, after proper deductions are made for freight, the consumer can readily decide which is the most economical for his own use. If he has wood-ashes convenient and at a reasonable price, it is probable that it will prove to be his most econominal source of potash; but there are, no doubt, many of our farmers paying too high a price for wood-ashes, and that to them, when freight and handling are counted, some of the mercantile salts of potash would prove much more economical. This is not due to the fact that wood-ashes does not form an economical fertilizer, but because even a good thing may cost too much and by its cost destroy the margin for profit.

Having decided upon the kind of fertilizer to use, the next problem which meets us is the amount to be used per acre. In the decision of this question, it should be remembered that the application of commercial fertilizers is a business transaction and is subject to the rules which govern such transactions. We apply them because we reasonably expect to obtain a benefit which shall be greater than their cost, and it naturally follows that, within certain limits, the greater the amount the greater the profit. Just where this argument ends can only be decided by careful experiment and the results of a number of years. It cannot be decided by the results of one or two years; the surroundings may have been such as to make these deceptive and unreliable; a favorable season may have given unusual results, or an unfavorable one may have given the opposite. We can only decide by a careful average, just as with any other business transaction; a merchant will not make advance based upon the result of one year, but will take the average of a number; if the application of five tons per year on a farm of one hundred acres pays, how much more may be applied with equal profit *per ton?* We believe that we are only in the primary stages of the use of artificial fertilizers, and that the amount now used may be multipled by ten with equal profit *per ton*, and when we compare the amount used in this State seven years ago (seventy-five thousand tons) with the amount used now, (one hundred and ten thousand tons,) we think our meaning will be understood. With the protection afforded to both consumer and manufacturer by our State law, we predict a rapid increase in the use of this class of goods, and that from an application to grain crops we may gradually progress to an annual application to grass and other crops common on the farm; that the application of a soluble fertilizer will pay on the hay crop has been proven, and sooner or later will be acquiesced in by practical men. That spring applications of a soluble fertilizer to wheat will pay can hardly be denied, and this mode of fertilizing, in addition to fall applications, will sooner or later be adopted. All that the manufacturer has to do is to convince the consumer that for the *average* application he will receive a benefit which will more than repay the cost of the application, and what we have predicted will soon follow. Progressive farmers are not slow to note places for good investments of capital, and we predict that the time will come when the application of commercial fertilizers will be looked upon as quite as legitimate and certain an investment of farm capital as the purchase of cows or cattle. We do not think that our farmers fully appreciate the extent to which this investment may be made with profit. In the older countries of Europe, applications per acre of fertilizers are made, which would startle our farmers; and the applications sometimes made on Pennsylvania farms are startling to the farmers of Nebraska and Kansas. If we are able, by the application of fifty dollars of fertilizer, to obtain an increase of sixty or seventy dollars in the crop, the transaction is a business one, and will be appreciated by more and more of our farmers each year. It is reasonable to suppose that the next ten years will not only witness a proportionate increase in the total amount of commercial fertilizers used in our State, but that we will see this proportion increased in a much greater annual ratio.

THE COMPARATIVE COMMERCIAL VALUE OF FERTILIZERS.

In the official lists of fertilizer analysis as issued by the Board, the reader will find a column headed "Comparative Commercial Value Per Ton." To this column manufacturers assign very different values, and some go so far as to claim that it is not only of no value to the consumer, but is a positive injury to the manufacturer. Other manufacturers admit frankly that it is of great importance to both manufacturer and consumer; and that without it, the table would have very little practical value to the consumer of this class of goods. We think that all manufacturers admit that chemical analysis is a complete test to the value of a commercial fertilizer, and they invariably buy or sell *to one another* by this index of value. That if a manufacturer makes a contract to furnish nitrogenous material of a certain percentage, and the analysis of a reputable chemist shows that the article furnished is not up to the standard of the guarantee, the receiver is entitled to a rebate in exact proportion to the discrepancy. In fact, the correctness of chemical analysis as a test, was established beyond a doubt by the experiments made by the Board during the past two years. Having this means of ascertaining the amount of phosphoric acid, potash, and nitrogen in any fertilizer, can we give to it a "Comparative commercial value per ton?" In order to answer this question, let us put the problem in another shape more familiar to the consumer. Suppose that from any cause a merchant should need a mixture of corn, wheat, and oats in certain proportions, and should advertise for bids for furnishing all he needed for one year. How would the farmer, knowing the proportions of each, arrive at an understanding of a safe bid? If the contract was for a certain specified mixture delivered on a day close at hand, the matter would be very much simplified; but in taking the contract for the year, the producer must take into account the varying prices of the grain which he will have to use, the cost of mixing, cartage, &c. Now, if in addition to requiring but one quality of corn, the merchant demands a certain named proportion of three grades of corn, which may be styled numbers one, two, and three, or first, second, and third quality, we then have this condition of affairs and this similarity between the supposed mixture and a commercial fertilizer. The three qualities of corn will represent phosphoric acid in its three forms; the oats may represent the potash, and the wheat the nitrogen. In the commercial fertilizer the analysis shows us just how much of each ingredient is in the mixture; in the grain the measure and the contract shows just how much of each has been put in, and thus far the two mixtures occupy the same relative position and their value may be governed by the same rules. The three grades of corn and the oats and wheat are all marketable commodities whose selling price is at all times quoted in our trades lists. Other trades lists show with equal exactness the market value of the ingredients of the fertilizer; and in this again they are similar. If the contractor who furnishes our supposed grain mixture will at any time multiply the number of bushels of each kind of grain in his mixture by its market price per bushel, he can at any time obtain data which will give him its "comparative value per ton," or per bushel, and he can thus at any time tell whether he is making or losing money by his contract. To carry the matter still farther: if he desires to carry his comparison throughout the whole year and wishes to obtain a table of comparison, he must, at the commencement of his year, establish for himself an exact price (average) for each one of his kinds or qualities of grain for the whole of his contract year. He cannot, for this purpose, change his value with every daily change in the grain market; he must establish at the commencement an *average price*, which shall, as nearly as possible, represent the average price. Here again the two cases are similar; for in arriving at a price for the ingredients of the fertilizer, we are compelled at the beginning of our fertilizer year to establish a set of values which shall last for the whole year and which cannot be varied by changes in market rates.

From this we think it would seem that there is no more difficulty in arriving at the "Comparative commercial value per ton" of a fertilizer than of a pile of mixed grain when the exact proportion of each is known and recorded. In both cases we have but to multiply the number of pounds of each by the established value per pound and the result is the item wanted to a fraction. It is as easy for the fertilizer manufacturer to know the exact market value of the materials which he uses as it is for the farmer to know the price of grain; either may consult their respective trades lists and select from reliable parties dealing in the goods wanted. One of our manufacturers writes us that the annual fixing of a price for each ingredient is unjust to the manufacturer, because prices may very materially increase as the season advances, but, on the other hand, we have just as much right to the other side of the argument, viz: that prices may fall. Again, suppose that prices do advance very much as the season advances, does that work any hardship to the manufacturer? Are not all on exactly the same basis? Will not the value attained in this way be just as much a "Comparative commercial value per ton" on a rising as on a falling market? If we cannot obtain a fair comparison in this way, then no commercial value can be established for any commodity. The price of fertilizer supplies is no more liable to fluctuation than is the price of grain; the contractor can as well guard against one as the other.

To go a little more into the *minutiæ* of the fertilizer valuation, we claim that the market price of acidulated South Carolina rock (which is sold on the basis of its "available phosphoric acid") will at any time furnish a market price per pound for this form of acid. Most chemists (including the chemist of the Board) admit that the values of soluble and reverted are the same, and hence the trade included both, under the head of "available." The market price of the leading potash salts will give us the value per pound of potash, for they are always sold upon a guaranteed percentage of potash (actual). In like manner the market prices of any one of the many distinct sources of nitrogen will give us its market price per pound, either at the commencement of the year or at any time during the year.

After what we have written, we think that the consumer will readily see that we have used the words "Comparative commercial value" advisedly and intentionally, and that the figures cannot be taken as the cost (to the manufacturer) per ton. In addition to the market value of his ingredients, he must add interest on capital, commissions, freight, and risk from bad debts; but on the other hand these are all items which affect every manufacturer alike, and in the end do not affect the value of the table as a means of comparison.

The reader will then bear us out in the claim that this column in our tables means exactly this: that if in the table he finds John Smith's phosphate valued at thirty-eight dollars and fifty cents per ton, he then knows that John Jones' phosphate is worth, in comparison, the price set opposite to it. The first may be an assumption, but compared with it the latter is bound to hold good. Nor will it do to compare complete manures (containing all three elements) with acidulated South Carolina rocks, which contain but one (phosphoric acid), or with kainite, which also contains but one (potash). Complete fertilizers should be compared (in comparative commercial value) with complete manures, and each class with others of the same class.

Some of our correspondents ask why we use the term "comparative *commercial* value," instead of the plain term "comparative value." In reply we would state that our lists are gotten up mainly for the guidance of consumers. This class, as a rule, will understand the term *value* to mean the result which they are able to obtain from the commodity valued. There may be a great variation between the "commercial value" of a fertilizer and its "agricultural value," or value to the consumer as gauged by the effect produced upon his soil or crop. The commercial value can at any time be ascertained and definitely fixed. On the other hand, the "agricultural value" is subject to causes and effects over which the farmer can exercise no control, and which he cannot foresee. The same fertilizer may give very different results upon opposite sides of a fence or road. The crops may have been different, the fertilizer may have contained an element which one field needed but the other did not need. Many and varied causes might be supposed, any one of which would affect and alter the agricultural value of a fertilizer, but which could not possibly affect its commercial value. No chemist would state that, because his table showed that John Smith's phosphate had a "comparative commercial value" of thirty-eight dollars and fifty cents per ton, and John Jones' acidulated South Carolina rock had one of twenty-eight dollars per ton, that the former was worth ten dollars more per ton *for any land* than the latter, nor would he say that because John Smith's phosphate (complete) showed a like difference in comparative commercial value that it was that much better (would produce that much better result, for the farmer.) The chemist well knows that the "agricultural value" of a fertilizer is subject to causes which no one can control and hence he will make no attempt to fix it.

To carry out the comparison, let us return to our mixture of the different grains again. Because we can so readily establish the "comparative commercial value" of two different piles (of different proportions of the same grains,) no one would argue from this that we can establish as readily, the "food value" of the mixture. The latter value will depend upon what kind of stock it is fed to and what it is fed for. In both cases the "comparative commercial value," is a fixed fact or, but the agricultural value of the fertilizer and the food value of the mixed grain are alike, in so far as neither of them can be fixed or estimated.

FERTILIZER ANALYSIS LISTS.

The annually increasing interest manifested in these lists and the increased number required to supply the demand, warrants a few words in explanation of their meaning and the manner in which they are arranged.

Under the provisions of the act of June 28, 1879, the Board is authorized to analyze "Such specimens of commercial fertilizers as may be furnished by its agents, said samples to be accompanied with proper proof, under oath or affirmation, that they were fairly drawn." Another section of the same act provides that "The money paid into the treasury under the provisions of this act shall constitute a special fund, from which the cost of such analysis shall be paid."

From these two quotations, it is evident that the Board can only receive samples from certain agents, and can only make analyses to the extent of the amount paid into the treasuary. It has no other source of income which it can devote to this purpose. No provision is made for the analysis of ores or other material, but the work must be confined to fertilizers only. It must be evident to all that it would not be proper for the Board to receive and publish the result of the analysis of samples sent by interested parties, for it would be manifestly unfair to make the credit of any manufacturer dependent upon a rival manufacturer or one of his agents. An impression has gone abroad that it is the duty of the Board to test all samples sent, without regard to their number or who may send them. There is no warrant in law or fact for such an assumption, but it has, each year, given rise to no small amount of correspondence and misunderstanding. A few (properly authorized) agents have felt slighted because every sample which they may send in is not tested and reported upon by the chemist. In very many cases duplicates are sent in and we have, in more than one instance, received a sample fertilizer from three agents (in different parts of the State) the same day. The amount paid into the treasury will not warrant us in testing each kind licensed every year. To test one kind several times would, of course, exclude some other equally worthy manufacturer, and hence we have endeavored to, as far as possible, make the number of tests coincide with the amount sold in the State, or with the amount of license fee paid by the manufacturer. The main variation from this rule has been with low-grade fertilizers, which have been tested, and the result published as often as was considered consistent with the public good. On the other hand, some manufacturers have assumed that they were entitled by law to have each of their fertilizers tested each year. The fact that many of the licenses only net the treasury eight dollars is sufficient answer to such an assumption, but, as far as possible, care has been taken to distribute the work as fairly as possible among those interested.

The samples as received are sent to the chemist, who returns his analysis in the form in which it appears in our lists, and he is responsible for both the analysis and the valuation. In all cases any appeal by the manufacturer is referred to the chemist, and if sustained, a proper correction is at once made by him; but no correction or alteration in the analysis is made except by the direction of the chemist, who is thus held responsible for the work done. When the chemist makes his return of an analysis, a copy thereof is at once sent to the manufacturer and another to the person who forwarded the sample; and ten days to two weeks is allowed before publishing, for an appeal by the manufacturer. If no error has been made in either the selection or the analysis, the result goes upon record and is published in the lists. In the performance of this duty the Secretary finds himself in a position of much delicacy, and his decisions (no matter which way they may result) are always open to criticism and dissatisfaction. The manufacturer has a multiplicity of reasons to account for the short-coming of any sample, and all these have to be carefully weighed before a decision can be attained. On the other hand, the selecting agent and the consumer are liable to place an unfair and unjust construction upon any leniency shown to the manufacturer. In some cases the Secretary has felt that great injustice has been done him by the criticisms which have followed changes which were believed to be just to either the manufacturer or consumer; but in nearly all cases the justice of the decision has been apparent. In some cases a just result could only be reached after another test of the same sample or the drawing of another; but in all cases care has been taken not to unfairly injure the business reputation of the manufacturer, and at the same time properly protect the interest of the consumer.

The first column in our lists is occupied by the "Name of the fertilizer," an item which is the cause of much deception and no small amount of difficulty to the Department. The Board must receive the name as it is recorded in our books or as it appears on the bags. Brands are found with the name of guano upon them, when it is shown by analysis that not a single particle of bird excrement enters into their composition. "Pure bone phosphates" are sent in, in which not a single particle of animal bone, as understood by the trade, is to be found. In some cases the same manufacturer makes and sells two brands of different composition and value but varying but a single (apparently) unimportant word; and if an error is made in the use of or the omission of this word, the Department is accused of unfairly treating the manufacturer, when it would seem apparent that this slight variation was made on purpose to confuse the consumer and assist in selling a lower grade of goods on the character of the higher one. "High grade phosphates" are found in which our chemist finds but about one half per cent. of available phosphoric acid; and in many other cases which might be enumerated, the name is deceptive and is, in too many cases, so intended.

The third and fourth columns contain the "soluble" and "reverted" phosphoric acid, and, inasmuch as chemists are willing to accord them the same, or very nearly the same, value, they might probably as well be merged into one column of "available phosphoric acid," and for our purpose will here be considered as one. This ingredient of fertilizers is derived from one of three common sources, viz: animal bone, South Carolina rock, or natural guanos, but in all cases it is believed that the value of the "available" is the same, and consequently our chemist makes no difference in value assigned. The value of the "insoluble phosphoric acid" (in the fifth column) varies with its source, which is of course the same as that of the two preceding columns, and is most valuable when derived from animal bone and least so when from South Carolina rock. To the many grades between these two extremes we will not refer, preferring to assign all such unsettled questions to our chemists. In mixed fertilizers this ingredient is very often obtained from a mixture of both bone and rock, and so universal has this become that the chemist has fixed a value of four cents per pound for insoluble in mixed fertilizers. The sixth column contains the percentage of soluble potash found in the sample, and to it our chemist has assigned a value of five cents per pound. Some manufacturers are disposed to object to this value, but as a large majority of them are willing to contract to furnish any reasonable amount of this ingredient at this price, we infer that the value assigned is not unjust or too low. In the valuation of the ammonia, as given in the seventh column, we find much more difference of opinion among chemists; but inasmuch as the value is used for comparison only and is used for all alike, it is probable that the value allowed by our chemist (eighteen cents per pound) is not far out of the way, especially as we find an entire willingness on the part of responsible manufacturers to furnish it at the price named. The eighth column, that of "comparative commercial value per ton," is fully discussed in another part of this report and only needs a short explanation at our hands. It must be remembered that these prices are fixed at the commencement of our "fertilizer year," (August 1,) and, once agreed upon, cannot be altered during that year, as any alteration or variation would destroy the value of the list as a means of comparison and reference. The figures of this column mean that at the commencement of the fertilizer year the ingredients found in the fertilizer could have been purchased in reasonable amounts for the sum total there stated. If this column gives the "comparative commercial value" of John Smith's phosphate as thirty-eight dollars and ninety cents, it does not follow that it will do the consumer that amount of good. We are to infer that it is worth this amount in *comparison* with other fertilizers in the same table. By purchasing in large amounts for cash, or by taking advantage of a sudden fall in market prices, the manufacturer may sell it at these figures with a good profit, but this is an item which we cannot control or make allowance for, and hence must confine ourselves to an unvarying price, which is quite as likely to be too high as too low and the variations of which will be just as likely to favor the manufacturer as the consumer.

The demand for these lists on the part of the consumers far exceeds our ability to supply them. The Board annually prints and distributes at least forty thousand of them, and the manufacturers probably have nearly as many more printed, but large as these numbers are they entirely fail to furnish the number asked for.

The value as an advertising medium of these lists is acknowledged by the manufacturer, and in two instances which have been brought to our notice, fraudulent lists have been issued; but an investigation, in which the manufacturers interested cordially assisted, it was found that the fraudulent lists had been issued by unauthorized agents and without the knowledge or consent of the manufacturer of the goods thus unfairly advertised.

In a number of cases manufacturers after changing the style or type of their own goods, have had large numbers of the lists printed at their own expense, and in several cases where judgment has been based upon such lists the Board has been unjustly accused of advertising the goods of certain manufacturers.

LOW GRADE FERTILIZERS.

During the past five years, the experience of each succeeding year has shown a decrease in the amount of fertilizers of a low grade sold in the State. It is true that our lists of analyses, as published, show a number of fertilizers which are evidently frauds upon the consumer and not worth near the price asked for them. This class of goods assumes a prominence on our lists which is no way proportionate to the sales, from the fact that we have endeavored to procure samples of all suspected brands, and, as far as possible, to give them the full benefit of the advertisement which our list affords. Another year's experience but adds force to what we have repeatedly urged upon the attention of the consumer, viz: that the proportion of fraud is much greater in low goods than in the higher-priced ones, and that it reaches its minimum in the standard brands of well-known firms. If we exclude from the list all brands of acidulated South Carolina rock, we find that, by taking out all selling for twenty dollars or less, per ton, we will exclude the most of those whose comparative commercial value shows them to be fraudulent and comparatively worthless. If our readers will compare the lists of five years ago with that of this year, this will become even more evident. Exclude all (including South Carolina rock) selling for twenty dollars per ton or less, add to the others five dollars per ton for the cost of mixing, freight, and commissions, and the result will demonstrate the decrease in fraud. The sales of our leading manufacturers, as is shown by their affidavits on record here, are greatly increased each year. This increase proceeds, first, from an increase in the use of this class of goods, and, second, from the fact that the effect of the execution of the law is to exclude all fraudulent goods. Two years ago a certain fertilizer was reported to the Department as "suspicious" and a sample was forwarded, which confirmed the suspicion, showing that the article which was sold for twenty dollars per ton was in reality worth but little more than one dollar per ton, or, in other words, all that was of value in a ton could be purchased in the open market for from ninety eight cents to one dollar and ten cents per ton. The manufacturers and agents were notified; the name of the fertilizer was changed; it was again reported as "suspicious" and three tests showed no improvement in its value. The general agent admitted freely that it was composed of one ton of marl mixed with ten bushels of air-slacked lime and was sold at the factory at almost any price per ton that the market would bear, varying from four dollars per ton to fifteen to the wholesaler and twenty to the retail trade. Several samples were tested and numerous lists sent into the neighborhood in which it was offered, and as a consequence two car-loads were, early in the season, offered for the freight bill. At present it is practically out of the market and but one lot is to be found in the State.

As a sample of this class of goods, our list shows that marl sent from York county, where it was offered at fifteen dollars per ton, was found to have a comparative commercial value of one dollar and three cents per ton. A "fossil fertilizer" from Westmoreland county was found to have a value of but seventy-four cents *per ton*. A "fertilizer" originating in Pittsburgh and selling at from twelve dollars to twenty dollars per ton, according to freight and location, was worth but fifty-one cents per ton. A sample of "high-grade phosphate," made in New York State and sold in Towanda, was found to possess a value of but five dollars and ninety-nine cents per ton, although thirty-five dollars was asked for it. A "nine dollar and ninety-nine cent fertilizer" was shown by repeated analyses to be worth from ninety-eight cents to one dollar and ten cents per ton; and yet its selling price was twelve dollars to eighteen dollars per ton. A "phosphate" from Lehigh county, offered at thirty-five dollars per ton, was found to possess a value of six dollars and sixty-one cents per ton. Wood-ashes imported from Canada at considerable expense was found to be worth seven dollars and twenty-one cents per ton. A "phosphate" selling in Schuylkill county for thirty-five dollars per ton was found to be worth fifteen dollars and twenty-five cents. A "fertilizer" from Lawrence county was found to possess a value of four dollars and twelve cents, with a selling price of thirty dollars. "Marl" from the Eastern shore of Maryland, offered at twelve dollars and fifty cents per ton, was worth but thirty cents. A sample of "phosphate" from Lancaster county, offered at twenty-eight dollars per ton, was given a value of five dollars and twenty-five cents. One from North Carolina, selling at seventeen dollars and fifty cents, was found to be worth three dollars and sixty-four cents per ton. To the casual reader this will no doubt appear to be a formidable list of fraudulent goods; but it should be remembered that the total sales of the whole lot did not probably exceed two hundred tons, and possibly not over one hundred. The very fact that their presence was noted on the list was enough to prevent their sale to any great amount, and to exclude them from the market after the first season.

Why will the consumer of this class of goods buy such articles when reliable manufacturers, whom he can hold responsible, will sell goods at so much lower (comparative) prices? It would seem that in most cases that the purchaser mistook bulk for quality and size of the pile for action. In many cases the agents offering these worthless goods were able to produce "certificates" from "those who have used our goods," showing what they had accomplished by their use, and misleading analyses were offered to prove that they were as good as higher-priced goods. The results of this year more clearly than ever show that it is safest to purchase only first-class goods from reliable manufacturers, who have a business reputation at stake, and who are willing to be held responsible for any just test or analysis. The old motto, "Buy only the best and from men of good business reputation," holds just as good with this class of goods as with any other.

The exposure in former reports of the low manurial value of ground limestone has very nearly caused its withdrawal from the market, and our returns lead us to believe that during the past year the sales have not exceeded one ton where twenty were sold the preceding year.

Chemical analyses and practical results clearly prove that "marls," valuable for their soluble potash alone, will not pay freight from New Jersey or Maryland to central Pennsylvania, and that as a source of potash the home supply of wood-ashes or the purchase of high-grade potash salts is much more economical. Both analyses and practice seem to prove that from one dollar to two and one quarter dollars per ton is all that can reasonably be expected from marl, and that to reach the higher of these prices only a selected article need be shipped. At the pits, where it can be purchased at the rate of less than seventy-five cents per two-horse load, and where it need not be hauled many miles, it is no doubt profitable, but the large bulk, when compared with the small amount of soluble matter, soon swallows up the total value in freight. Our analysis would seem to indicate that "Poudretts" are to be classed in the category of fertilizers which will not bear freighting from the extremes to the interior of our State, and that there are, except close to the place of manufacture, other articles which will furnish the same value at a much less cost. This fact arises mainly from the fact that the material from which this class of fertilizers is made requires such a large amount of absorbent that the value per ton is decreased and the bulk and weight increased to a point at which the addition of a small amount of freight will counterbalance the actual fertilizing value of the mixture. Until some mode of concentration has been discovered, it seems evident that this kind of material, like marl, will have to find its profitable market near the place of manufacture; the sales of both of these classes have been small and are confined to localities as above described.

During the past year, we have received from different portions of the State samples of material "supposed" to have a value as a fertilizer, but which upon analysis have proven valueless for this purpose. There are no provisions by which we can test this kind of material, and for all tests made we have had to depend upon the generosity of Dr. Genth, who has been very kind in the assistance afforded.

THE COST OF BEEF.

The evident over-production of milk in our larger cities seems to have aroused an interest in cattle-feeding, which has in its turn caused our correspondents to make more than their usual demands upon us for information. We regret to be compelled to report that the reliable data upon which we can estimate the cost of ordinary beef production is small indeed. In almost all cases upon record, the data has reference to animals whose record has not been that of the average animal, and whose results cannot be imitated with profit by the average feeder. A writer in alluding to animals exhibited at the fat stock show in Chicago states that "the average daily gain from birth of the yearlings was more than two pounds; that of two-year-olds was a fraction less than a pound and three quarters, and that of the three-year-olds was but a fraction over a pound and a half. Or if we assume that these six yearlings would attain at the same ages the weights shown by the two-year-olds and three-year-olds in the above statement, the growth for the first six hundred and eighteen days being 2.04 pounds per day, that for the next three hundred and fifty-seven days it would be 1.11 pounds per day, and that for the last three hundred and thirty-seven days it would be 1.21 pound per day."

The reports of the Chicago Fat Stock Exhibition of 1882 give the *average* cost of a number of animals raised and fed by different persons and under varying circumstances, as follows: At the end of the first year, thirty-nine dollars and nineteen cents; at the end of the second year, forty-four dollars and eighty-five cents per head; at three years old, eighty-one dollars and fifty cents per head. The report of 1883 places the average cost at the above ages at thirty-three dollars and ninety-three cents, forty-seven dollars and twenty-five cents, and eighty-three dollars and sixty-four cents respectively, or showing a total cost of one hundred and stxty-four dollars and eighty-two cents per head.

A practical estimate of the cost of a well-fed animal at one year and nineteen weeks old is as follows:

First cost of calf,	$5 00
4 weeks new milk, 14 pounds per day, at 1 cent,	3 92
10 weeks skim milk, 16 pounds per day, at one fourth of a cent per pound, and 2 pounds of oats or middlings at seven eighths of a cent,	4 02
16 weeks on daily diet of 10 pounds of skim milk, 2 pounds of oil cake, and 2½ of oats or middlings,	10 00
22 weeks (end of first year) 10 pounds of hay, 2 pounds oil cake, and 2 pounds of cornmeal,	17 32
19 weeks (to 71 weeks old) grass at 30 cents per week, 3 pounds oil cake, and 5 pounds of cornmeal daily,	16 67
Care and attention,	8 00
Insurance,	1 00
Total cost at 71 weeks old,	$65 93

If at this age we estimate him to weigh twelve hundred and dress six hundred pounds, worth six cents per pound, or a total of seventy-two dollars and four cents, adding to this twenty per cent. of the value of the food as the value of the manure, we may credit the account with a gain of twenty-eight dollars and seven cents.

A correspondent of the Board residing in Lehigh county furnishes the following estimate of the actual cost of the animal at three years old:

1st year—	Calf at 4 weeks old,	$4 00
	Pasture and skim milk,	6 00
	Hay and meal,	9 00
	Cost at one year old,	$19 50
2d year—	Pasture,	6 00
	Hay, meal, and fodder,	12 00
	Cost at two years old,	$37 50
3rd year—	Pasture,	8 00
	Hay and meal,	18 00
	Cost at three years old,	$63 50

Manure to pay for care and attention.

Another correspondent furnishes a detailed statement of items showing the cost of a three-year-old animal to have been sixty-six dollars for feed, &c.

The following table, condensed from the report of the cost of animals exhibited at an exhibition of fat stock, is instructive:

NAME OF ANIMAL.	Total cost for first twelve months.	Weight at twelve months.	Value at twelve months.	Cost per pound up to twelve months.
Jay, No. 101,	$31 30	800	$48 00	$3 91
Experiment,	33 50	710	42 60	4 72
Young Aberdeen,	31 67	1,000	60 00	3 47
King of the West, 18,	100 67	1,000	60 00	3 47
Cassius 4th, No. 20½,	31 47	1,000	60 00	3 15
Cassius 5th, No. 29,	38 15	1,000	65 40	3 50
Hattie, No. 44,	19 75	700	42 00	2 08
Jim Blaine, No. 27,	27 50	950	57 00	2 89
Canadian Champion, No. 17,	33 67	1,000	60 00	3 37

Carrying on the account with some of the same animals, during their third year, we have the following table:

NAME OF ANIMAL.	Weight at twelve months.	Value at twelve months.	Cost during second year.	Weight at two years old.	Value at two years old at six cents per pound.	Cost per pound of gain during second year.
Jim Blaine,	950	$57 00	$37 50	1,390	$83 40	$8 52
Jay,	800	48 00	30 31	1,370	82 20	5 31
Young Aberdeen,	1,000	60 00	52 12	1,600	96 00	8 68
King of the West,	1,000	60 00	52 12	1,600	96 00	8 68
Canadian Champion,	1,000	60 00	52 12	1,600	96 00	8 68

Of the last five, two were carried to the age of three years. Of these the following shows the result:

NAME OF ANIMAL.	Weight at two years.	Value at two years.	Cost at three years.	Weight at three years.	Value at three years at six cents per pound.	Cost per pound during third year.
Canadian Champion, ...	1,600	$96 00	$81 50	2,250	$135 00	$12 54
King of the West, ...	1,600	96 00	81 50	2,250	135 00	12 54

An analysis of these three tables seems to demonstrate that at the end of the first year any of the animals would have given a profit varying from 3.92 cents per pound in Hattie, to 1.73 in Experiment. That at the end of the second year's feeding but one of the animals gave any margin for profit, and that only in the case of Jay, at the rate of sixty one hundredths of a cent per pound. That the third year's feeding resulted in a loss of from 6.54 cents per pound, provided we do not credit the animals with an increased value per pound

The profits of feeding for beef will depend very much on: First, The kind of animals fed. Second, The manner of feeding. Third, The time of year at which they are fed. Fourth, The time of year at which they are marketed. Fifth, Cost of material fed and value (to the feeder) of the resulting manure. If the feeder owns the land upon which they are fed, and gets the full benefit of the manure, he can afford to feed at figures which would ruin the farmer who rents. If he is so situated that his hay has but a low market value, and he can afford honestly to credit it, with the straw and labor, to increased manurial value, he then may have a good margin where others not so favorably situated would fail entirely.

The following shows the debit and credit side of the account of feeding ten grade Short-Horn steers for one hundred days:

By 10 steers, 12,100 pounds, at 6¼ cents per pound, . .		$943 75
By 10 steers, 12,000 pounds, at 4½ cents, ...	$544 50	
13,250 pounds grain, at $1 10, ...	145 75	
6,000 pounds hay, at 60 cents, ...	36 00	
13,500 pounds straw, at 40 cents, ...	54 00	
		780 25
Profit, ...		$163 50

Mr. Stewart states that the ration fed these cattle was as follows:

"Combined ration made by grinding together ten bushels (560 pounds) of corn, eight bushels of oats and peas ground together, (384 pounds,) and one bushel of flaxseed, (56 pounds,) making one thousand pounds, at a cost of one dollar and ten cents per one hundred pounds.

An analysis of the above table shows that the increase of three thousand pounds cost very nearly eight cents per pound. From this it is evident that if the profit had depended upon this increase alone, the transaction would have been disastrous. But as the animals sold for two cents per pound more than they cost, the gain in price on the original weight, (12,100 pounds at 2 cents, $242 00,) which, added to the debit side of the account, leaves a margin of one hundred and sixty-three dollars and fifty cents for profit, less the labor, which is supposed to off-set the increased value of the manure.

THE COST OF PORK.

From the material furnished by one of our correspondents in answer to our question as to the actual cost of producing pork, we condense the following :

Four lots of two pigs each, all of the same litter, were fed for the experiment. After two weeks of feeding on grain, they were weighed and divided into the four lots; they were then six weeks old. No. 1 were fed sixty-two pounds of cob meal, No. 2 were fed sixty-two pounds of clear cornmeal, No. 3 had sixty-one pounds of middlings, and No. 4 had sixty-two pounds of cob meal and middlings, equal parts by weight.

Lot No. 1 in fifty days consumed three hundred and eighteen pounds of cob meal and two hundred and eighty-six quarts of skimmed milk, and gained one hundred and thirty-one pounds.

Lot No. 2 in the same time ate three hundred and thirty-seven pounds of clear cornmeal and two hundred and eighty-six quarts of milk, giving a gain of one hundred and thirty-five pounds.

Lot No. 3 consumed three hundred and four pounds of middlings and two hundred and eighty-six quarts of milk in the same time, with a gain of one hundred and forty-six pounds.

Lot No. 4 in the same space of time ate two hundred and forty-seven pounds of middlings and cornmeal mixed, and gained one hundred and eighteen pounds.

A former series of experiments had proven that it required twelve quarts of the milk to make a pound of gain; deducting this amount from the gain as given above, we have the following figures as representing the gain from the grain.

Lot No. 1, growth per hundred pounds of food 33.6, cost per pound of growth 2.34 cents.

Lot No. 2, growth per hundred pounds of food 32.9, cost per pound of growth 3 cents.

Lot No. 3, growth per hundred pounds of food 40.1, cost per pound of growth 2.5 cents.

Lot No. 4, growth per hundred pounds of food 38 pounds, cost per pound of growth 2.6 cents.

The cob meal was charged at eighty cents per hundred pounds, the cornmeal and the middlings each at one cent per pound.

S. Barber, of Franklin county, Massachusetts, furnishes the following from his own experience:

On the first of May I took two pigs, of the Chester White breed, that weighed twenty-two pounds apiece, and kept a correct account of what they ate and its exact cost till they both were butchered on the first of November. Of course this does not include the grass, weeds, and raw apples that were given them during the summer months, which were not of large amount, but had their special use and value. To these pigs were also fed one thousand quarts of skimmed milk and one thousand five hundred and fifty-six pounds of meal and wheat-bran or shorts, at a value of seventeen dollars and twenty cents, making five hundred and thirty-nine pounds of dressed pork. The pork was sold for five and a half cents per pound, and with the meal eaten it cost three and three tenths of a cent to make a pound of meat, which, even with the price of the pork, there was a profit of two and one fifth cents per pound. But taking into account the quantity of milk fed and calling it one cent per quart, we increased the cost of feeding to twenty-seven dollars and twenty cents, which, deducted from twenty-nine dollars and sixty-three cents, leaves two dollars and forty-three cents as the value of the pigs at the time the experiment was begun. But by adding seventeen pounds of rough lard, at five and a half cents per pound, we have ninety-three cents, which, added to two dollars and forty-three cents, makes three dollars and thirty-six cents; and if we regard the haslet of any value, as it was used as food in the family, it would be worth at least the difference between three dollars and thirty six cents and four dollars, the price paid for the pigs. So that it will be seen that there was no loss in fattening pork, for what was received for it exactly balances the cost. But when we found a market for our skimmed milk at home, at one cent a quart, it will be seen that there was decided gain, for what was of trifling value was turned into real money.

THE COST OF FENCING.

The last census shows that the annual cost of maintaining the fences surrounding the farm land of our State is over five million five hundred and seven thousand four hundred and fifty-six dollars, but it fails to give us the total or first cost of these fences. The preceding census enables us to give this cost or value at one hundred and seventy-nine million eight hundred and thirty-four thousand four hundred and four dollars, and it is but fair to suppose that their value has not materially altered during the past decade; the same data shows nine hundred and fifty-five rods of fence to each hundred acres, and gives the average cost or value at one hundred and fifteen dollars per rod; it shows a cost of one thousand one hundred and twenty-four dollars and twenty-five cents to each one hundred acres. Applying arithmetic to these figures, we find that we require two dollars and thirteen cents' worth of fence to keep one dollars' worth of live stock from injuring one dollar and fifty-four cents' worth of crops. Applying the same data to the national farm area, we conclude that we use one dollar and seventy-four cents' worth of fences to keep one dollar and sixty-five cents' worth of live stock from injuring two dollars and forty-five cents' worth of crops. That taking the figures of the last census as they refer to the *annual* cost of maintaining the fences of Pennsylvania as correct, we each year spend one dollar to keep fifteen dollars' worth of stock from injuring crops worth twenty-four dollars. If, to the annual cost of repairs, we add interest on value at five per cent., we have the total annual cost at fourteen million four hundred and ninety-three thousand three hundred and seventy-six dollars; or, in other words, that it annually costs one dollar to keep five dollars and seventy cents' worth of live stock away from eight dollars and nine cents' worth of crops.

The statistics collected by the National Department of Agriculture indicate that the average worm fence of this State costs its owner ninety five cents per rod; the average post-and-rail fence, one dollar and thirty five cents; and the average board fence, one dollar and twenty-six cents per rod; and that the cost of the average stone wall is two dollars and thirty-five cents per rod.

From statistics from a source, the practical nature of which cannot be doubted, we give the following figures as the cost of different kinds of fence common in our State; the reader will, of course, make such changes in the figures as the cost of the material in his neighborhood will warrant.

Post and Board.

Distance, ninety-four rods, or one thousand five hundred and fifty-one feet; number of panels, one hundred and ninety-four, of eight feet each; material used, one six-inch hemlock board at bottom, three five-inch boards, and one five-inch cap board:

97 six-inch boards, at 14 cents,	$13 58
388 five-inch boards, at 12 cents,	16 06
195 chestnut posts, at 12 cents,	23 40
100 pounds of nails, at 3½ cents,	3 50
Carting material four mile to fence,	9 00
Setting posts and putting on boards—6 days at $1 50,	9 00
	$107 54

Posts with Chestnut Rails.

Distance same as before; one hundred and forty-one panels, of eleven feet each; rails, twelve feet long, but lose one foot in lapping; one post and four rails per panel:

143 posts, at 15 cents per post,	$21 30
564 rails, costing 12 cents each,	67 68
Carting material four miles,	15 00
Mortising posts and pointing rails,	16 00
Setting fence—25 panels per day—6 days, at $1 50 per day,	9 00
	$128 98

Posts with White Cedar Rails.

Distance same as before; rails, ten feet long, one post and four rails per panel:

156 posts, at 15 cents per post,	$23 40
620 rails, at 12 cents per rail,	74 40
Carting material four miles to fence,	15 00
Mortising posts and sharpening rails,	16 00
Setting fence—25 panels per day—6 days, at $1 50,	9 00
	$137 89

This data places the first cost of each of these three kinds of fence as follows: Board fence per rod, one dollar and fourteen cents; chestnut rails, four to the panel, one dollar and thirty-seven cents per rod; and post fence, with four cedar rails per panel, one dollar and forty-six cents per rod. The *average* Pennsylvania farm would then have expended on it (to renew all the fences) for a board fence ten hundred and eighty-seven dollars and seventy cents; for a post-and-rail fence, with four chestnut rails, thirteen hundred and eight dollars and thirty-five cents, and for white cedar rails, thirteen hundred and ninety four dollars and thirty cents.

How much of this fence and this outlay is unnecessary? How much may be saved by a more economical shape of the fields? How much saved by a movement of fences with reference to the crops which they separate?

In the shape of the fields, much may be saved by a close attention to certain mathematical rules. Of all possible shapes, that of a circle will inclose the greatest area with the least possible fence. This, however, is impracticable. The next most economical form is that of a square, and after the circle, will inclose more ground with less fence than any other form. Those who have given the matter but little attention will be surprised at the rapidity with which the proportion of fence needed to inclose a given area increases as the form of the field leaves that of a square and assumes the shape of a parallelogram. To inclose a plot of ten acres in a square form will require eight hundred and eighty rods of fence; to inclose the same area in the form of a parallelogram, twice as long as wide, will require eleven hundred rods. In a similar manner, we might illustrate the increased ratio necessary to inclose a given area in other shapes. We admit that in many cases the shape of the field is dependent upon the water-supply and other items beyond the control of the owner, but we think we are safe in claiming that fully one fourth of our farm fences are unnecessary and might be avoided by a greater care in the shape and cropping of the fields.

THE ACTION OF LIME.

The result which follows the application of lime to the soil may be attributed to one or more of the following causes: First, To its action upon the vegetable matter already present in the soil, in greater or less amounts, and coming from decayed roots, dead grass, barn-yard manure, or other sources. Second, From its action upon the mineral elements in the soil already composed of bases in connection with acids in various proportions. Third, Its mechanical effect on the soil. Fourth, Its action as a manure.

It is an undoubted fact that when mixed with vegetable material in the presence of air alone lime tends to preserve it for an indefinite time, when mixed with the same substance in the presence of both air and moisture. This preservative power is very little, if any, diminished; but when a third element in the form of ordinary soil is introduced into the mixture, the result is entirely changed, and instead of a preservative action we find that the vegetable matter quickly decomposes or decays. Its separation into its component parts is rapidly increased, and it consequently becomes more readily available as plant food. As a proof of this, mix ten bushels of dry chips from the wood-pile, and two bushels of fresh lime, with enough water to slack it completely; the effect is preservative; but to the same mixture add ten or more bushels of ordinary soil, and decomposition soon begins and is rapidly accomplished. Hence the benefit of lime in the compost pile. Nor is the increased rapidity of decomposition the only benefit derived from the addition of lime either to the soil or the compost heap: its strong affinity for most volatile substances (of which nitrogen may be taken as a type) enables it to form a compounds with them and thus prevent serious loss.

Lime acts upon the mineral elements in the soil in several ways which vary with the material acted upon and with the character of the soil; lime applied to soils containing disintegrated rock rich in potash, has the effect of releasing the potash from an insoluble or comparatively (to the plant) useless form, and after breaking up the old compound to form a new one of a much more valuable character. The potash of our most common rocks (which, when disintegrated form the bulk of the soil,) is in a form in which it is of little or no use to plant-life, often in combination with an acid for which lime has a much stronger affinity and of which lime will rob the potash, if an opportunity is afforded. Air-slacked lime, mixed in a dry state with marl or kainite renders the insoluble potash more soluble; mixed with substances containing nitrogen, it will release it.

The mechanical effect of lime is probably but a small proportion of its action, yet it enters into the consideration when its action and effects are under discussion. One hundred bushels of air-slacked lime may bear but a small proportion to the great bulk of the soil, but when we remember that it (at least at first) only mixed with a small portion at or near the surface, we must admit that its mechanical effect is considerable and of some importance in effecting results.

The actual manurial result of lime is no doubt very small, and scarcely worthy of consideration. All soils, however poor in other elements, contain enough lime in an available form to supply the wants of innumerable crops, and the constant action of the elements is adding to the store much faster than it is exhausted. From eight to fifteen pounds per acre will supply the wants of any of our ordinary farm crops.

From this it would then seem that the results attained by the application of lime must be attributed to one or both of two modes of action, viz: by its effect in making the vegetable matter in the soil more readily available to the crop or in having a similar effect upon compounds (mineral) existing in the soil, and that lime does not add anything of value to the soil, but merely renders that already existing there more available; hence we may very properly consider it as partaking very much of the nature of a stimulant, enabling the soil, for the time being, to support an increased vegetable product which must derive its substance from the soil itself, and consequently leaving it just that much poorer (except in cases hereafter noted) and less able to stand continued drafts upon its substance.

We can have but little control over the mineral elements in the soil, and the action of lime upon them is the same with all crops and at all seasons of the year; hence it would seem evident that to obtain the best effects of such an application it should be made at the time when vegetable matter is most abundant and when it is most needed by the growing crops. Such is the logical deduction from reasoning and analogy and such is the result of practical experience. Practice demonstrates that lime produces its best effect when applied to the sod previous to plowing it down for corn or to the stubble after wheat and before mowing for hay. At other times it may, and probably does, produce a similar effect, but, owing to the combination of circumstances, its effect is not so apparent to the farmer. As the action of lime is due to chemical changes, and as all such changes are promoted and hastened by the presence of air, it follows that lime should be kept near the surface, for, if covered deeply, although the amount of moisture is increased, the air is, to a certain extent, excluded and the operation consequently retarded.

Bearing in mind that lime acts as a stimulant, merely making existing food available and furnishing very little, if any, itself, it follows that little or no permanent improvement can justly be expected from its application, unless the increase attributed to it is kept on the field or farm. To apply lime without manure and to remove the surplus from the farm can lead but to one result: the exhaustion of the land, and the time which it can stand such a drain upon its resources will depend upon the amount of material in a condition in which it can be acted upon. Certain it is that almost any known soil can soon have its stock of vegetable matter exhausted (none being in the meantime added) by the application of lime. If a soil already contains a sufficient stock of *available* vegetable matter—potash and possibly nitrogen—the application of lime will show very little result, or, if it does, we must attribute it to mechanical action. Such cases may and no doubt do occur, and give rise to much adverse testimony as to the value of the application.

The old English adage has it: "Lime enriches the fathers, but impoverishes the sons." The truth of this, however, depends entirely upon what use the "fathers" make of their enrichment. If they sell the increase and remove it from the land, the adage will hold good; but it is not applicable when a proper use of material is made. Remembering that lime is a stimulant rather than plant food, we can readily see how this can be and why some soils are made poorer by its action; on the other hand, we may see how many soils can be and are permanently enriched by its application. From a combination of these two experiences, we can also readily see why there is so much diverse sentiment even among practical men.

THE EXHAUSTIVE EFFECTS OF DIFFERENT CROPS.

The solution of this problem is dependent upon factors, whose existence and value can only be determined by the highest scientific authority; and, accompanied with a nomenclature shrouded in mysterious terms at the very onset, discourage the practical farmer. Divested of these, the solution becomes more simple; and when reduced to plain terms, soil exhaustion is simply taking more out of the purse than has been added to the original store; simply a course of management by which the sum total of the checks exceeds the daily balance; simply the use of principal for the payment of interest.

We may properly regard the soil as an immense store-house of plant food, containing enough to supply the needs of hundreds of crops. But, at the same time, we must not lose sight of the fact, that to be of any use to the plant this food must be in a soluble form; and that it only becomes soluble by contact with the atmosphere, and only in limited amounts. If we increase the crop, we must also increase the amount of soluble food; and if we increase this we are drawing upon our principal.

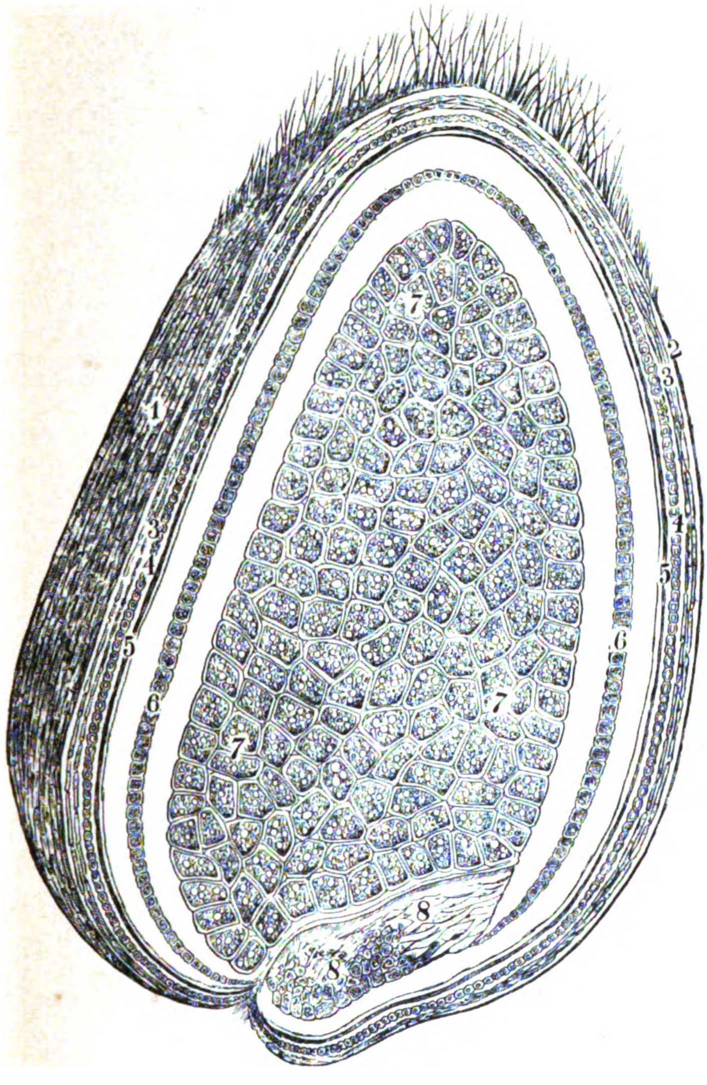
It is an axiom in nature that, since the completion of the Creation, nothing new has been made and nothing old destroyed. New forms have been assumed, but they are but the old matter re-arranged. Old forms have passed away, but their elements have also been re-arranged and have not been lost.

It needs no argument on our part to prove that our crops must obtain their substance from one or both of two sources: the soil and the atmosphere, and that all of their component parts are traceable to one or both of these sources. The elements obtained from the atmosphere must be in a gaseous form, while those from the soil are of a more solid nature. These two classes of matter, united in the same plant, are not so closely conjoined as to change their nature; and hence they can be readily separated and their relative amounts determined with considerable accuracy. Though not an exact agent for the purpose, we may assume that fire or carbonization will divide them, and that in this division the ash left will represent that portion of the plant derived from the soil, and that which escapes in the form of smoke, the portion obtained from the atmosphere. We say that this division is not exact, because in the chemical changes which have taken place, certain atmospheric elements may have become fixed, or, as it were, a part of the soil food, and are not separated by the process of burning.

Let us apply this test to our leading crops and accept the result as a comparison of soil exhaustion. As a familiar example, and as a unit of measure, we may take a crop of wheat yielding twenty-two bushels per acre, which will yield two thousand seven hundred and fifty pounds of straw, or a total weight of four thousand and seventy pounds, removed from the field. If this yield is completely burned, we will find that we will have left, in the form of ash, one hundred and seventy-six pounds, thus leaving three thousand eight hundred and ninety-four pounds, which was supplied by the atmosphere. We then assume one hundred and seventy-six as the unit of measure for the soil exhaustion of this crop, and will apply the same test and rule to other crops. A soil capable of producing twenty-two bushels of wheat should yield twenty-two of rye, thirty-five of barley, twenty-three of buckwheat, fifty of oats, fifty of corn, one hundred of potatoes, fifteen hundred pounds of tobacco, and four thousand of clover hay. The total weight removed by these crops may be estimated as follows (including straw): Corn, eight thousand eight hundred pounds; potatoes, six thousand; rye, four thousand three hundred and twenty; wheat, four thousand and seventy, clover, four thousand; oats, three thousand seven hundred and fifty; and tobacco, fifteen hundred. The weight of ash left by each will be as follows: Corn, three hundred and eighty pounds; tobacco, three hundred and sixty; potatoes, two hundred and seventy; clover, two hundred and fifty-six; rye, one hundred and seventy-nine; wheat, one hundred and seventy-six; buckwheat, one hundred and seventy-four; oats, one hundred and sixty-one, and barley, one hundred and forty-two.

These figures presuppose that the whole crop is removed from the soil and that no portion of it is restored by feeding to stock. It is also assumed that the soil and atmosphere furnished all of it and that none is to be credited to fertilizers of any kind. As this is seldom, if ever, the case, the figures given represent the extreme of soil exhaustion, and we may very properly modify them so that they will more nearly correspond with the usual practice of returning the straw and fodder of the crops and removing the grain only.

Discarding the soil food absorbed by the straw, fodder, and other portions returned to the soil, we will have the following figures as measures of comparative exhaustion: Tobacco, three hundred and sixty; potatoes, two hundred and seventy; oats, fifty-one; corn, forty-two; wheat, thirty; barley, twenty-nine; rye, twenty-six; and buckwheat, twenty-two. These figures may be taken as the measure of soil exhaustion, and they also represent the number of pounds of soil elements removed by the crop, when nothing but the straw and fodder are returned. When all of the products are fed on the farm, it is evident that the soil exhaustion is very much reduced; the amount of reduction depending altogether upon the nature of the animals to which it is fed, and the care taken to preserve the volatile



A Grain of Wheat Magnified.

1–The side of the crease; 2–The *epidermis* or cuticle; 3–The *epicarp;* 4–The *endocarp;* 5–The *testa* or *episperm*, containing the yellow coloring matter; 6–The *embryous membrane;* 7–The *endosperm* or flour; 8–The *embryo* or germ.

elements of the resulting manure. This exhaustion is still further decreased by the addition of atmospheric elements of the food to the manure pile.

It may be claimed that the removal of thirty pounds of ash does not account for the soil exhaustion caused by a crop of wheat of the yield named; but it must be remembered that the portion thus removed was soluble and that of the bulk of our soil but a very small portion is in this condition or is available to the plant.

To obtain a proper measure of the value of the elements of these crops, let the farmer attempt to replace them by the purchase of artificial fertilizers. The manufacturer may deceive the farmer by a well-arranged analysis upon the bag; but the crop and soil cannot be deceived by any such arrangement of figures. The elements must be in proper amount and condition, or the crop will suffer. A crop of corn yielding fifty bushels of grain will remove from the soil (in addition to its soda, magnesia, lime, silica, and sulphuric acid, which may be replaced at a little expense,) one hundred and thirty-six pounds of potash, and thirty-seven pounds of phosphoric acid, which may be replaced by a good commercial fertilizer at a cost of eleven dollars and eighty-five cents, and the expense of the application.

The following table, very much condensed from the report of Prof. Wolff, gives the proportions of phosphoric acid, potash, and nitrogen actually found in two thousand pounds of each article named. We have not attempted to reduce the ratio of exhaustion to a rate per acre, because the yield will vary under different circumstances, with different modes of culture, and with every change of latitude and soil. Any of our readers can, by the application of arithmetic, reduce the table to a ratio per acre which will suit his own neighborhood, soil, or mode of cultivation. The results are as follows:

	Pounds of nitrogen.	Pounds of phos.acid.	Pounds of potash.
Common mixed hay,	31.0	8.2	26.4
Clover hay,	39.4	11.2	37.2
Young grass,	11.2	4.4	23.2
Green corn-fodder,	3.8	2.0	7.4
Potatoes,	6.8	3.2	11.6
Sugar beets,	3.2	1.8	7.8
Turnips,	3.6	1.6	5.8
Wheat straw,	9.6	4.4	12.6
Rye straw,	8.5	5.0	17.2
Barley straw,	12.8	3.8	21.4
Oats straw,	11.2	5.6	32.6
Corn, (grain,)	32.0	11.4	7.4
Barley,	32.0	15.6	9.4
Oats,	38.4	13.6	9.6
Buckwheat,	28.8	11.4	5.4
Peas,	71.6	17.2	19.6
Beans,	81.6	23.8	26.2
Wheat-bran,	44.8	54.6	28.6
Cotton-seed cake,	78.0	56.2	29.2
Linseed cake,	90.6	32.2	24.8

These figures may then be taken to represent the amount of each one of these elements taken from the soil where the crop is removed from the farm and none fed there. If to those figures we apply those which our chemists tell us represent the actual market value of the three elements and multiply the number of pounds by this value per pound, we have the following results in dollars and cents:

Common mixed hay,	$6	19
Clover hay,	8	10
Young grass,	2	86
Green fodder,		98
Potatoes,	1	67
Sugar beets,		90
Turnips,		87
Wheat straw,	$2	19
Rye straw,	2	26
Barley straw,	3	11
Oats straw,	3	30
Corn, (grain,)	5	77
Barley,	6	10
Oats,	5	95
Buckwheat,	$5	22
Peas,	12	55
Beans,	14	61
Wheat-bran,	9	70
Cotton-seed cake,	16	24
Linseed cake,	16	45

If we assume this table as correct and make no allowance for vegetable matter and the variation in its amount, we arrive at the conclusion that in exhaustive effects (all being removed from the farm) there is but little difference between one ton of corn (grain) and six tons of sugar beets; between one ton of oats (grain) and four of potatoes; between one ton of barley (grain) and one ton of mixed hay; between one ton of peas and two of mixed hay; between one ton of wheat-bran and one and one half tons of oats; or between one ton of oats (grain) and two tons of oats straw.

By reversing the calculation and supposing that all of the fertilizing value may be saved to the farm, this table may be taken as an index of the manurial value of the different kinds of food; but in using it for this purpose, allowance must at the same time be made for vegetable material in the grass, hay, fodder, and straw.

COMPARATIVE VALUE OF STOCK FOODS.

During the past season, more than usual interest has been manifested in the comparative feeding value of the different articles more commonly used as stock food, and numerous letters have reached us asking for the comparative values of corn meal and cotton-seed meal, of wheat-bran and corn meal, of corn and oats and of the value of the refuse of glucose factories. In some cases the writers have failed to furnish the important information as to what kind of stock they proposed to feed, and without this information the officers of the board were quite as likely to go wrong as right.

Any one experiment intended to show the comparative value of any two or more kinds of food can at best be of little use in settling the matter; in many cases the difference in the feeding capacity of the two animals experimented upon may affect the result one way or the other. We have fed two steers side by side, with the same food and treatment, and had one to gain in weight twice as fast as the other. Two cows may have the same food and attention, and yet vary very materially in their yield of milk and butter. Two calves will, with the surroundings as nearly the same as possible, often give very different amounts of growth. It is only by long continued experiments, in exactly the same direction, that we can hope to arrive at reliable results; we must not only know that the animals exercise no confusing influences on the experiment, but we must also know by actual test that the two kinds of food properly represent the classes to which they belong. When the exact experimenter speaks of cotton-seed meal, we must know whether it is pure, or whether, like much that is on the market, it is adulterated; and if it is adulterated, we must know what effect these adulterations have on the result. We might give instances where correspondents have written us that cotton-seed meal has produced certain bad effects upon their stock, and that on this account they have been compelled to discard it entirely; whereas, an exact test might have shown that the results which it gave them, and which were the reverse of those usually obtained, were the result of adulteration, and were not chargeable to the meal itself. When one experimenter attains results the reverse of the usual rule, it is best to examine carefully for items which may have exercised an effect. In fact, the results of any single test in feeding are not to be depended upon. In Europe, much more attention has been given to this question that in this country, and we, as a people, are too prone to obtain what we call results by means of short cuts which the European experimenter has long since given up as entirely fallacious. Perhaps none have given the questions of food values more careful attention than the German experiment stations, and yet they are very slow to give results.

Wolff assigns the following value per ton to each kind of food specified:

Meat scrap,	$55 60	**Beans,**	$15 20
Dry ground fish,	46 00	**Clover hay,**	14 00
Cotton-seed cake,	41 40	**Meadow hay,**	12 80
Linseed cake,	34 40	**Oats straw,**	9 00
Cornmeal,	22 20	**Potatoes,**	5 80
Wheat-bran,	20 80	**Turnips,**	2 20

It is to be presumed that these values are the result of careful and exact analyses, and we are to assume that if, when fed to a certain animal for a certain purpose, one ton of cornmeal is worth twenty-two dollars and twenty cents, then ten tons of turnips are worth the same amount; or, rather, that they contain the same amount of nutriment. The practical reader will no doubt be struck with the similarity in value of cornmeal and wheat-bran; and, like the correspondent who asked for the information, will ask if there is not something wrong about it. We can only say that we give the figures as they come to us, and that Wolff is not credited with making mistakes. Whether the bran which he had to deal with was the same in quality as is known to the American farmer, we cannot say; but the result does not agree with our own experience with it, either as a flesh or milk and butter producer.

Bousingault, a noted chemist and experimenter, furnishes us with the following table of comparisons in which "good hay" is taken as the standard of comparison and marked at ten:

Rye straw,	61	**Cabbage,**	37	**Bran**	9
Oats straw,	55	**Corn,**	6	**Oil cake,**	2
Barley straw,	52	**Wheat,**	5	**Clover hay,**	8
Wheat straw,	52	**Rye,**	5	**Good hay,**	10
Turnips,	61	**Barley,**	6		
Carrots,	35	**Oas,**	5		

The reader will note that in this table bran is given a very different comparative value from that assigned it by Wolff. The former made it worth ten tons of turnips, while the latter makes it equal to 6.75 tons.

A third (German) authority gives the following valuations, in which the comparisons are arranged in a way exactly opposite to the other two:

Rye,	72	**Buckwheat,**	60	**Potatoes.**	17
Corn,	68	**Linseed meal,**	56	**Carrots,**	7
Barley,	67	**Hay,**	50	**Turnips,**	5
Wheat,	67	**Straw,**	16	**Mangolds,**	8
Oats,	62	**Brewers' grains,**	18		

DEDUCTIONS IN STOCK FEEDING.

From a very carefully conducted series of experiments in feeding, made on the Ontario (Canada) experimental farm, we obtain the following conclusions:

First. That corn-fodder cut and drawn from the field when green, cut into inch lengths, packed into a common rough stone root-cellar with six hundred pounds of pressure to the superficial yard, can be preserved, except adjoining such a wall, for an indefinite time in a condition fit for animal food at a cost of not more than one dollar per ton, exclusive of the cost of cultivation.

Second. That in competition with common Swede turnips, this ensilage corn-fodder gave fifteen per cent. less milk, thirty per cent. less butter, and a poorer marketable butter in color.

Third. That damaged wheat may be economically used as stock food for fattening cattle if fed at the rate of nine pounds per head, with a daily increase of two pounds per day, at a cost of four and one half cents per pound.

Fourth. That rice meal in fattening cattle gave a daily increase of 1.81 pounds per head per day, at a cost of about seven cents per pound.

Fifth. That barley meal in fattening cattle requires a large amount of other food in connection with it, and that eleven and one fourth pounds per head per day gave a daily increase of 2.14 pounds, at a cost of seven cents per pound.

Sixth. That cornmeal took the highest place in the daily ration of increase in fattening cattle, nine and one fourth pounds per head per day, added weight, which cost but five and one half cents per pound.

Seventh. That pea-meal gave the second best daily increase at the least cost, eight and one half pounds per head daily, gave an increase of 2.28 pounds per day, at a cost of five cents per pound.

Eighth. That a pure-bred Short-Horn steer can be made to weigh seventeen hundred pounds when twenty-three months old, or at a daily increase of two and one-half pounds.

Ninth. That Herford grade calves can be made to weigh six hundred and eleven pounds when two hundred and thirty-eight days old, or a gain at the rate of two and three quarter pounds per day.

Tenth. That during the winter a thousand-pound steer will consume daily ten pounds of hay, thirty-nine pounds of turnips, four pounds of bran, and nine pounds of mixed grain and add to his live weight at the rate of 2.11 pounds per day.

Eleventh. That one pound of live weight may be added to a feeding steer by eleven pounds of dry substance, chemically.

Twelfth. That, as a result of a number of experiments, the cost of adding one pound of live weight to a feeding steer of one thousand pounds is six cents to the feeder who grows his own materials, and twelve cents when the food is bought in the regular market, no account being taken of manure.

Thirteenth. That sugar beets, when compared with turnips, gave the best results, and with other foods, gave an increase in live weight of 2.7 pounds per head per day.

Fourteenth. That there is either a simple natural reason or a hidden chemical one in the fact that by the use of less grain and more roots a greater daily gain was obtained.

Fifteenth. That the present market for wool (in Ontario) is best supplied, and to the greatest profit to the producer, by Shropshire downs, which gave fourteen per cent. more of value than any other breed tested.

As the result of a large number of careful observations in dairy practice, the following results are suggested:

That there is no such animal as the "general purpose cow"—one to do the best for the dairyman and the butcher.

That an average cow, for dairy purposes, should give twenty pounds of milk per day, during two hundred days in the year, eight pounds of cream for every one hundred of milk, and forty-five pounds of butter from one hundred of cream, and fully ten pounds of cheese from one hundred of milk.

That bulk volume, or per cent., is not a safe criterion of the quantity of butter to the amount of cream, and that weight alone is the proper test.

That breed, as much if not more than food, affects the quantity and quality of milk, cream, butter, and cheese.

That, in the experience of the Ontario station, the Short-Horn is an average milker, short in duration, per season, low in specific gravity, high in per cent. of cream, proportionately so in butter, and also high in cheese product; and that this breed comes nearest to the "general purpose cow."

That the Herford is not more prominent than the Short-Horn in regard to milk, except in proportion of butter from cream, in which it is highest. The grade is very prominently in advance, particularly in the proportion of cream, but lowest in cheese.

That the Devon is most distinct in highest specific gravity of milk and weight of cheese from milk.

That the Ayrshire is a particularly heavy, long milker, giving five times her own weight per season. The milk is somewhat low in specific gravity and per cent. of cream, but is above the average in cheese production.

That the Jersey is remarkable for proportion of cream, averaging thirty per cent., and giving a value of dairy products incomparable to any other breed in the experience of the station.

That the native or common cow of the district surrounding Quebec (which are not to be classed with the common Canadian cow) takes a high place in value of annual product, and, along with the Short-Horn grades, is the cow for that country.

EFFECT OF THE FIRST IMPREGNATION UPON FUTURE PROGENY.

In by far too many cases, our farmers who are breeders on a small scale are careless as to the quality of the male serving the mares or cows for the first time. The argument too often used is that the first foal or calf is seldom worth raising and anything will be good enough; the same care which is afterwards so well adhered to is not exercised. When our breeders realize that the first impregnation exercises a powerful effect upon subsequent ones, and in some cases may even nullify those which will follow, we will have made a very important step forward, and one which, in the future, will show its results in our farm animals. Probably there is no stock-breeder who reads these lines who will not admit the correctness of this, but many of these are careless in this important matter.

We might fill pages with cases proving the correctness of the theory, but a few must suffice. The writer once purchased twenty pure-bred Cochin hens and one rooster, and had the misfortune to lose the latter in his passage to the farm. In the rush of work incident to taking possession of the first time, and the (then) great difficulty of replacing the lost fowl, a well-developed black Spanish rooster was allowed to run with the hens. Of course the progeny was a cross between the two, in which the black Spanish (from prepotent power) predominated; the succeeding fall all of the progeny, including the rooster, were either sold or killed and a pure-bred Cochin rooster of undoubted pedigree purchased. Next season the progeny was quite as much on the mixed order as the first year. The blood on both sides was of a strain which admitted of no doubt. The original hens (and they alone) were retained, but they never afterwards produced eggs to be depended upon. The writer might also duplicate this result in the case of a Chester White sow and Berkshire boar, in which the former produced more spotted pigs (when bred to a white boar at the second impregnation) than in the first litter. Sir Champion (a noted thoroughbred Guernsey) so affected cows served by him that the after progeny of other and entirely different bulls resembled him almost as closely as his own offspring. Thus we might multiply cases and proofs, not only from our own experience, but from the recorded experience of others. Suffice it to say that the correctness of the theory is so well corroborated as to admit of no doubt.

Admitting the argument, we may then very properly pass to a solution of the mystery, and endeavor to ascertain why this influence is exerted, and how it may be avoided.

Professor James Law thus explains it: "It is a well-known pathological fact that adjacent cells tend to engraft their plastic or formative powers upon each other. I prick my skin with a needle. Immediately the injured cells and nucli undergo a rapid increase in size and numbers, but the effect does not end there; those adjacent take on a similar action, and the extent of the resulting inflammation is only limited by that of the injury and susceptibility of the parts. Again, in placing a slice of epidermis in the middle of a raw sore we inoculate the cells of the adjoining granulations and empower them to develop epidermic structure. How, then, can we avoid the conclusion that the impregnated ovum impresses its own character on the mass of the decidua, and through this on the maternal placenta, and that this in turn impresses its character on the decidua and embryo?"

Dr. Dalton writes as follows: "Another very remarkable phenomena connected with pregnancy and parturition is the appearance in the uterus of a new mucous membrane growing underneath the old one, and ready to take the place of the latter after its discharge. If the internal surface of the body of the uterus be examined immediately after parturition, it will be seen that at the spot where the placenta was attached every trace of mucous membrane has disappeared."

All attainable evidence, both scientific and practical, proves conclusively that the female cannot carry the offspring without an interchange of blood between them, and that the mother influences the character of that offspring by the particles of her own body, (in the form of blood), and it is equally true that the offspring exerts a lasting impression upon her; it is further true that the extent of this influence will very much depend upon the extent to which that offspring resembles or inherits the peculiarities of its sire. If, as in the case of Sir Champion, the bull, by his prepotent power, invariably imprints his offspring with his own characteristics, the mother of this offspring will, to a similar extent be permanently affected.

From these facts we may deduce the following important points, which should impress themselves upon the mind of every breeder of live stock:

First. That a thoroughbred female, no matter how well bred, having been served by a mongrel male, cannot produce thoroughbred stock by the best male that can be found.

Second. The stronger the prepotent power of the male, the greater the extent of the taint in her blood.

Third. That although this animal with tainted blood may drop offspring which seems to have all the characteristics of the thoroughbred, yet its offspring, even with the best male of like blood, cannot be depended upon to produce thoroughbreds.

Fourth. That the only sure way to get good stock is to start with good stock from the very first, and we are almost tempted to add, as an axiom, that, if there must be any carelessness, let it be at a later impregnation, but never at the first one.

Fifth. That no one can tell where an error of this nature will end; certain it is that it must follow the offspring through life and its progeny after it.

SELECTION OF SEED.

A consolidation of the reports which annually reach us of loss to the corn crop from a failure of the seed to grow, plainly shows that a greater degree of care in the selection of the seed would richly repay at least nine tenths of the corn-growers of our State. The replanting seldom yields more than fodder, and, as a consequence, the missing plant is a loss to the extent of the grain which its product would have represented. If one of our readers will select a fair hill of mature corn from his field, carefully weigh either the ears or the shelled grain, multiply the result by the number of possible hills per acre, the discrepancy between the actual and the possible yield will surprise him, It can hardly be claimed that it is possible to have every hill perfect, but it is surprising how much improvement in this respect might be made by a little more care with the seed. A single hill seems to be a small item, but as the crop is made up of the aggregation of just such hills, the importance of even one is shown.

One of the most prominent causes of the failure of the seed to sprout is its selection from the crib at planting time. If the condition of the season has been such as to allow the grain to properly dry before cold weather sets in, no special harm is done ; but in ordinary seasons these conditions are not present. Severe freezing weather sets in before the cob has absorbed the surplus moisture of the grain and the germ is injured beyond repair. This may be avoided by selecting the seed-ears at husking time and putting them in a moderately warm and dry place, at least until the surplus moisture has been evaporated. After this has been removed, the grain may be exposed to a low temperature without damage. The conflicting testimony which we have as to the effect of low temperature on this grain is due to the fact that in one case the test is made with undried ears and the other with those without surplus moisture. We do not know of any definite experiments to show the limit to which this drying process may be carried without injury to the grain, but we have good reason to think that if increased gradually a high degree of heat, unaccompanied by moisture, will do no harm. It was always the practice of the writer to select seed-corn at husking time, and as each load was hauled in to put the seed ears on an open rack at the ceiling of the kitchen immediately over the cook-stove, where a constant fire was kept. No observations were made to ascertain the average temperature, but the seed invariably sprouted well and little or no replanting was necessary. One peculiarity observed was that this almost kiln-dried seed, if planted side by side with that selected from the crib at planting time, would come through the ground first.

With the best seed which we can procure, there will, at all times, be a percentage of loss from grains which produce no stalks. At the New York Experiment Station it was found that, of a certain lot of seed-corn, one hundred per cent. would grow when planted under the most favorable conditions attainable in the seed-house, but that when taken to the experimental plots and there planted in the open air, under the best conditions attainable of one lot of two thousand three hundred kernels, but two thousand and nineteen grew in; another lot one thousand one hundred and eighty-eight kernels produced but one thousand and six stalks. In one case, but eighty-five per cent. grew, and in the other, but eighty-four. In another case, two hundred and sixty-four kernels planted produced two hundred and forty-three, or ninety two per cent.; and in a fourth experiment, the same number of grains produced but one hundred and eighty-one, or sixty-eight per cent.

With wheat and oats, we do not experience this trouble, because they are harvested at a season when they have ample time to get rid of their surplus moisture before cold weather; otherwise, we would experience exactly the same difficulty with them. In the smaller grains our care of the seed is mainly confined to such a selection as will result in permanent improvement; just how far this selection may be carried with profit has never been proven, but that it is well worthy of the attention of farmers will not admit of a rational doubt. In England, Sir Frederick Hallett has, by a careful and systematic selection of seed-wheat, obtained a product which he can readily dispose of in the open market at the rate of a guinea (five dollars) per bushel. His observation showed that the wheat-plant possessed two peculiarities: First, The habit of "stooling," or spreading from a single plant or grain, and the habit of forming two additional rows of grain (one on either side) of the head. Believing that these peculiarities could be increased by careful selection and cultivation, he commenced an experiment which has brought him a fortune and which should serve to stimulate all to a more careful selection of this and other seeds. Mr. Hallett found that as this "tillering" process was increased the tendency to lodge or fall down before harvest was proportionally lessened, and that in a crop of sixty bushels per acre none was lost from this cause. He further found that instead of the common wheat-head, with its two rows of grain up each side, it was possible, under ordinary field-culture, to produce heads with (in the center) five rows on each side, and that, while the length of the head was increased, the length of these extra rows was also proportionally increased. He further found that by planting large fields by hand with one grain in a place, in squares of nine inches, he was able to obtain from his improved seed crops which were double the average of England. The difference in climate will, and has, prevented us from taking up this improvement where Sir Frederick has left it; but there is no reason why, with some of our acclimated wheats, some one of our farmers might not reach similar results. It is admitted that climatic influences are against the American farmer in all of his steps in this direction, but that much is possible is made evident, not only by what Mr. Hallett has done, but also by what, in many instances, has been accomplished in this country by careful selection and cultivation in special plots. That there is room for some one to make money with such a specialty is evident.

DIVERSIFIED AGRICULTURE.

A careful investigation of the subject will convince any one that the successful farmer of the present and future is he who carries out, to its fullest extent, a diversified system of farming. It is also noticeable that nearly all of the failures among farmers have been among specialists—farmers who have but one string to their bow, and when this fails are lost. Men whose resources have been devoted to one crop or product and whose energies have been directed to the development of a single interest to the exclusion of all others, which if successful, yields large profits; but with a series of failures extending over several years, they find themselves stranded. It is no doubt true that the Pennsylvania farmer cannot compete with his Western brother in the production of grain—the low-priced lands and discriminating freight rates give the latter an advantage for which the former has no compensation. It may be, and possibly is, correct that the Pennsylvania farmer cannot compete with the stock-raiser of Montana or Texas in the production of beef. In either of these branches, the Eastern farmer will find that his Western competitor can place his products in the markets of the Old World for a less cost than will move the Eastern products to the Atlantic seaboard, and that he is fighting against odds which must in the end overwhelm him.

But, while he finds that he cannot successfully pursue either of these branches alone, he also finds that combining them he may obtain a fair profit. By feeding home-grown grain to home-grown animals for beef or milk, he will find a sure and safe home market for a first-class article—a market in which he is not subjected to the direct competition of the Western producer, because the latter cannot put his products into the same market in the same first-class condition.

One of the drawbacks to successful agriculture is the all-prevailing habit of rushing into the production of special crops; crops which, for the time, promise to yield more than the average rate of profit. For several years past tobacco has afforded more than an average crop profit, and, in accordance with former habits, we find neighborhood after neighborhood going into the production of a crop with which they have little or no practical experience, gaining at considerable cost this experience, only to find, as now, that the market is overstocked with tobacco and the crop not likely to prove profitable for several years to come. In many cases, costly sheds were erected, which, if the crop is taken out of the rotation, become practically useless.

We have in mind many farmers who have kept themselves poor by constant changes in cropping, each change involving some outlay which absorbs all the profit of previous crops, and this is in turn followed by another which is also accompanied by its own peculiar expenses, and so on year after year. Such men are to be found in all neighborhoods, and it is almost proverbial that "When it rains money their plates are upside down." Too often they only decide to go into the production of some special crop when it has been overdone and others are leaving it for some other which seems to promise larger profits. There is, perhaps, no class of farmers more unfortunate than those who are continually trimming their sails to an expected breeze, which too often never comes, or, if it comes at all, not until after the ship is stranded.

He who produces the greatest range of crops has the best chance of a high average profit; and the farmer who, no matter what may be the vicissitudes of the season, always has two or three crops in addition to the one which fails, is sure to come out best at the end of a term of years. The specialist may do best for one or two years, but the actual profit must be estimated for a term of years and not by the single crop or season.

The one exception to this rule is the specialist who seems to be peculiarly suited to the crop; who, by devoting his attention to this crop, seldom if ever fails. Others may follow (as they think) exactly in his footsteps and yet fail, and pocket a loss where the specialist obtains a profit. Jethro Tull once said that "It requires special brains for special crops," and a careful examination of such men, as they are found in every neighborhood, will convince the examiner that there is something in the saying. We have in mind a farmer who, from his small area, can always obtain from fifteen to twenty cents more a bushel for his wheat than any of his neighbors; his manner of cultivation, manuring, and cropping were the same as those of his neighbors, and the whole difference in value was caused by the adjustment of his grain-fan so that he uses none but the heaviest grain for seed; by this he secures a heavier berry and a gradual improvement.

In some cases, we find a specialist who can secure good profits from carp-culture, while others who appear to follow in his tracks fail to find any profit in it. It is true that he does nothing which others might not do, but which they do not do, and thus fail.

The man who, having selected a course of crops suited to his soil and climate, and sticks to this course through thick and thin, will come out best at the end of ten years. By keeping in the same channel, his plate is right side up when the season of profit comes, and he not only catches his own share, but also a portion of that which escapes from the inverted plate of his neighbor.

SOILING AND ITS DRAWBACKS.

Notwithstanding the many and great benefits which have been from time to time urged in favor of soiling, it is an undisputed fact that the practice is not making much headway among practical farmers; the saving in fencing and the increased number of animals which may be successfully maintained to the acre are indisputable items; they are admitted even by the most violent opponent to the practice, and are probably not much over-exaggerated by its friends. Why, then, is this mode of feeding not more generally practiced?

The difficulties and hindrances, aside from the slowness of our practical farmers to receive and act upon anything new, are as follows: *First*—The difficulty of keeping up a regular supply of green food for a large number of animals. It is easy to plan on paper to keep up this supply, but the failure of a single crop (a contingency never provided for in paper calculations) may throw the whole system wrong. We could instance one farmer who depended largely upon rye for a soiling feed, who, by using old seed, failed to get a crop, and his late seeding prevented a repetition during the fall or early winter. Numerous writers have given the kinds of crops needed for a complete rotation so as to cover the whole season, and the contingency of one or more possible failures might readily be guarded against by an increased area, the surplus of which, in case of a universal good crop could be dried for winter consumption; hence we cannot attribute the failure to adopt the system to this one difficulty. *Second*—The system requires an increased amount of labor at a time when other crops need attention; the preparation and seeding-down of the crops absolutely necessary to carry one hundred head of stock through the season is very great, and to one not acquainted with the work seems discouraging, but this difficulty would certainly be gotten over if the result was found to pay. The constant effort of the farmer is (or should be) to make use of all the labor for which his crops will pay, and he who cannot get more than the amount of wages paid to a man, out of the work of that man, can scarcely be styled a good farmer. If soiling will pay for the extra amount of labor needed, that item would not stand in the way of the adoption of the system by even a majority of our farmers. The work of hauling the green food from the field to the animals is also a very important item, which must be added in all comparisons with the older and more general systems of pasturing; but this, too, would not be withheld by the intelligent farmer, if his experience demonstrated that he could get more out of it than he paid to his extra help.

Against this item of increased labor of hauling the crops, we may charge the increase in the animals' flesh, which would otherwise have been exhausted in walking after the food; and to this may be added the extra value of the manure saved in the yard, which some of the more enthusiastic adherents of the system claim will fully repay all the extra items of expense. It has been claimed by a number that in all cases yet fairly tried the health of the stock suffered by confinement incident to the plan. Of this we know practically but little, but it would seem evident to all that enough exercise for health could readily be allowed and the system be so expanded as to combine enough of the old plan to insure all that is needed. One of the greatest drawbacks which has come to the notice of the writer is that all green crops do not attain their maximum feeding value until they have gained a certain degree of maturity. In our experience with dairy cows, we have found green corn or rye of no value in adding to the butter yield until they were in blossom. We have found that, while the cows would eat them up moderately clean, we could obtain no increase in the amount of butter until both the rye and sowed or drilled corn were out in tassel or blossom. This experience we find to have been one which has met many who have experimented with soiling on a small scale or as an adjunct to short pastures. No doubt the same objection will apply to all other green crops, and, if so, is a serious drawback to soiling for the butter dairy.

E. W. Stewart, of New York, furnishes the following as the result of an experiment with soiling, as applied to feeding steers:

The animals to be fed were twenty steers, three and four years old, eight cows, and six horses. These were equal in feeding capacity to thirty-five cows. One hundred acres of land, thought to be just sufficient to pasture these animals, was selected, and the whole product either fed to the stock named or dried and stored for hay. Ninety acres was an ordinary meadow, (some clear timothy, some timothy and June clover)—five acres in excellent clover, two in oats, and three in fodder corn. The animals were fed from May 20 to December 1 from this hundred acres, with a surplus of sixty-five tons of hay, which sold at the barn for nine hundred and seventy-two dollars. An accurate account of the labor was kept—it required six hours' labor of one man and two hours of one horse per day, costing, in cheap times, seventy-five dollars. The grass was cut by hitching the light mowing-machine behind a one-horse cart and driving around until enough for one day's feed was cut; two cart-loads were fed each day. After deducting the cost of putting the hay in the barn, ninety-seven dollars and fifty cents, and the labor of soiling, seventy-five dollars, making one hundred and seventy-two dollars and fifty cents, a net gain was left of seven hundred and ninety-nine dollars and fifty cents—while the twenty steers of eleven hundred pounds brought only thirty-four dollars per head, or six hundred and eighty dollars—showing a gain on the experiment of one hundred and nineteen dollars more than the value of the twenty steers, besides making one hundred large loads of rich manure, valued at one hundred dollars more than the dropping would have been worth on the field.

Again, we may ask, if Mr. Stewart's figures are correct, why do not more of our practical farmers follow the practice? We fear that many of our readers will find fault with some of the items of this account and will claim that all has not been charged, but the figures as given still leave a margin after all fair deductions have been made.

CHANGING SEED—IS IT NECESSARY?

When we examine the correspondence of the Board for an answer to our query, we find among our correspondents three distinct classes: *First*—Those who deem a change of seed necessary or beneficial under all circumcumstances and with all crops; *second*—those who do not consider it beneficial with all crops, but, in laying down the rule, make many exceptions; and *third*—those who do not consider it to be necessary under any circumstances. We also find that each class hold to their faith with about equal tenacity and firmness, presenting facts (so-called) in defense of each practice.

In our investigation of the question, we propose to confine ourselves to a change of seed; not from one variety to another of the same species, but from one farm to another, the variety being the same in both cases. Our query is not which is best among a number of varieties, but in its actual condition resolves itself into the theory that by proper care and selection any seed may be kept up to a given standard.

We must remember that many of our varieties now under cultivation are not fixed types—that is, that they have not their distinguishing features fixed as have the different kinds of grain. By high cultivation and heavy manuring, we cannot change one to the other, but by this mode of procedure we can, by a few crops, entirely change the character of any kind of wheat; by heavy manuring, white and thin-skinned wheats will become dark-skinned and thick-hulled, and we may set it down as a rule that whatever tends to increase the crop will at the same time increase the tendency to reversion or running back to the original type. If a lot of ten bushels of wheat be divided among ten different farmers, selected at random, the resulting products will so vary in a few years that it will require some persuasion to induce any one to believe that they all sprang from the same stock. In its original type, our wheat was dark in color and thick in skin, and all reversions are towards this type.

If we will take the trouble to follow the subject up, we will find that all of our so-called new varieties result from the selection of one or more chance heads, which owe their variation to some special condition and which soon lose the peculiarity when these conditions are removed. We could name a farmer who, for a long term of years, always sold his crop of wheat at from ten to fifteen cents above market price for seed. His soil was like that of his neighbors. His manner of cultivating, manuring, and seeding did not differ from theirs, except that it was, perhaps, rather more careful and thorough. His crop seldom exceeded five acres, and, to obtain the seed for this, he selected the heaviest and best seed by throwing it by handfulls across his barn-floor and only retaining for his own seed that which fell furthest from him. From this, and other reasons of a similar nature, we arrive at the conclusion that, by careful selection, there is no absolute necessity of a change of seed-wheat, and that, after the grain becomes acclimated, as it were, to any special soil, a careful selection will keep it up to the established standard.

Many are very confident that a change of seed is absolutely necessary with oats, and that it is the one grain which proves the theory most conclusively; but if our argument is correct as to wheat, it will apply with equal force to oats. A careful selection of seed, with reference to weight and plumpness, will be as likely to secure the desired result as any other plan. In our experience we have obtained as good crops from our own seed, weighing thirty pounds, as from Canada-grown grain, weighing forty pounds, and once obtained a crop averaging not over twenty pounds from seed of the latter kind. A skillful arrangement of the riddles and screen-board of the fan will enable us to get heavy seed out of very poor grain.

We usually find that those who are so tenacious as to a change of seed-wheat and oats hold on with great tenacity to their own seed-corn, and why? Is it not because they exercise more care in selecting the seed of this crop? And is not this fact a strong proof that the same care would produce the same result with wheat and oats, and that, too, with very little more trouble? Suppose the farmer was as careful, not only in selecting his best heads of wheat for seed, but also saved the best grains from these best heads, does any one suppose that we should hear so much about changing seed?

In all discussions relating to changing seed, it is customary to bring in the potato as a clinching argument in its favor, and yet it has nothing to do with the question, for we do not use the seed of the potato, and the rule which governs tubers or underground branches cannot be applied to true seeds; even if it were proven that this crop was benefited by a change of seed, it would have no effect upon our topic. In the potato, we cut the bud and place it in the soil instead of the stock, hence the rules which apply to budding will apply with equal force to potato cultivation.

To give a final answer to the question, we would state that, in our opinion, with careful selection there is no need for a change of seed.

THE PROPER DEPTH FOR PLANTING WHEAT.

The introduction of attachments for regulating the depth of seeding by the different grain-drills has aroused an interest in ascertaining the proper depth for planting or seeding. A rule established and found correct as applied to one kind of grain will not be of any use in a general sense, and each must be experimented with under different rules and plans.

Taking the wheat-grain as a starting-point, one of the first items arousing the attention of the experimenter will be to find that wheat and rye stand by themselves in the list and are subject to certain rules and conditions which are peculiarly theirs. If, under the same circumstances as to variety, soil, fertilizers, &c., we plant a row of wheat at depths varying from a half inch to six or eight inches, we shall find, in addition to the usual rules of varying depth, still another variation. Coming up at different times, we permit them to perfect their growth until they commence to "stool" or "tiller," and we will find the roots which nourish the plant are all at very nearly the same distance from the surface, and that, to all intents and purposes, the variation in depth of planting has been overcome by the peculiarity of growth. At a certain stage in the growth of every plant of wheat, we will find two distinct sets of roots, one above the other, with the upper set at a regular distance (no matter how deep they were planted) from the surface. The deeply-planted grain first throws out from its base a clump of roots and in the other direction the embryo stalk, which takes its course towards the surface. After securing an outlet into the air, this stalk soon establishes the natural balance between the supply of food from the soil and that drawn from the air, and as soon as this balance is fairly established, a small bulb appears on the stalk about one half to five eighths of an inch from the surface. This gradually swells until it reaches its proper proportions, when another set of roots are thrown out from it and soon collect the food of the plant, which becomes independent of the original roots at or near the seed. The time at which this bulb and second set of roots are formed will vary with the condition of the soil, the character of the season, and the amount of fertilizer used. As a rule, the plant lives during the winter upon the nourishment collected by the first set of roots, but, the writer has in more than one case, found the second roots thrown out late during an open autumn and after heavy manuring. In all cases where the formation takes place during the fall, the chances of the crop are very materially increased, for this growth is important in another direction. From the upper portion of this bulb the "tillers" or extra collections of stocks from the same seed are thrown out. It therefore follows that the earlier the date at which they are formed, the longer the period for their formation and the greater their number.

Even when the grain is covered to what experiment would seem to show was the proper depth, this bulb is still formed and throws out an increased number of roots and tillers ; but for this habit of growth, we could obtain but a single stock from each seed, and of course decreased crops. The engraving shows in Fig. 2 a grain planted at about the proper depth, and Figs. 1 and 3 show grains planted much deeper. Fig. 1 shows the deeply-planted grain before the secondary roots have been formed, and Fig. 3 the same plant after the formation of these roots. The increased size of the bulb in Fig. 3 denotes that the plant is nearly ready to throw out "tillers" near or at the surface. Fig. 3 further illustrates another difficulty which is increased by deep planting, viz: "winter killing." The plants in Figs. 1 and 3, having a depth of soil varying from three to five inches between the seed and the surface, do not suffer so long as the whole surface above them is frozen alike, but in all cases where the frost does not reach to the full depth of the grain, any change of temperature has a tendency to break the stalk between the seed and the surface. If this takes place after the surface or secondary roots are formed, but little injury is done ; but when, by shallow freezing and constant changes of temperature, the position of the soil is varied, the injury is very much increased. It is to this cause that we may attribute the fact that late-sown wheat is much more liable to winter-kill than earlier sown fields, and why it is more likely to winter-kill on light or poorly manured fields than in those which have all of the requisites for vigorous growth.

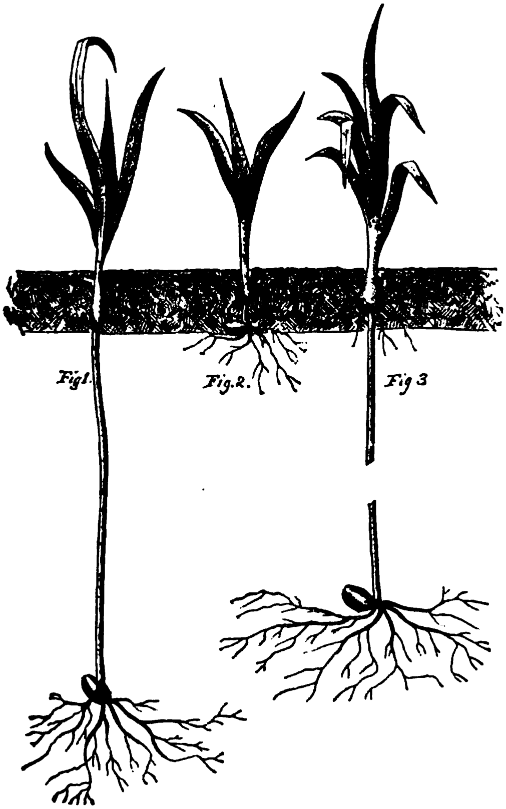


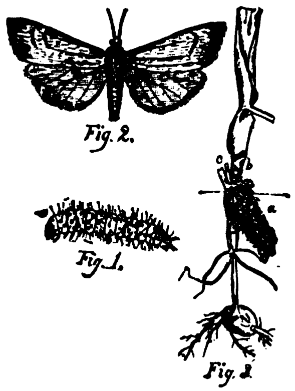
Fig.1.
Fig.2.
Fig 3

The actual effect of planting at different depths has never been properly ascertained, all experiments yet reported being for but a single year. From the fact that peculiarities of season may have much to do with it, the experiments, to be of value, must extend over a considerable period, so as to secure as nearly as possible a combination of all possible circumstances and causes.

THE WEB WORM.

A Lancaster county correspondent forwarded us several stalks of recently planted corn, which brought with it evidences of damage from the web worm.

We reproduce from the excellent report of Prof. Forbes an engraving showing the different forms of this pest of the corn-grower: Fig. 1 shows the larva of the moth (shown by Fig. 2); Fig. 3 shows a plant which has been injured by the worm; *a* is the nest of the worm as shown after the removal of a portion of the loose earth; *b* shows the location of the injury, and *c* a stalk or leaf drawn over the opening in the soil. The worm leaves the nest to live on the lower leaves of the plant, and thus far no remedy has been discovered, except to dislodge them with a paddle or stick, and after driving them to the surface, destroy them with the foot; the injured stalks will, of course, show their location, which is fortunately near the surface of the ground. Prof. Forbes states that this pest matures from the middle of June to the first of July, (in the latitude of central Illinois,) and that late plowing is the best and most economical preventive, the work being delayed until too late for the young plants to be attacked by the worm, which, during the latter part of its life in that form, is very sluggish in its movements.



THE GRAPE PHYLLOXERA,

(*Phylloxera vastatrix.*)

Tiny as this insect is, the injury done by it is almost incalculable. In France, the ravages have been so extensive that the government has taken steps to assist the vine-growers to protect themselves. Although it appears to have originated in this country, yet European vineyardists have found that vines from this country best resist its ravages and do not succumb nearly as soon as home-grown vines. It has shown itself in almost as great numbers in Germany, Portugal, and in some portions of England. In this country it has lately invaded the vineyards of California, and as the varieties there grown do not share with our native vines in their ability to resist its attacks, it is probable that it will seriously injure this important industry of the Pacific coast.

This pest is found in two forms: the one producing galls on the leaves

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The writer takes this opportunity of acknowledging his indebtedness to Prof. Saunders' excellent work, "Insects Injurious to Fruits," for illustrations and many of the ideas herein given.

of a greenish red or yellow color, and distinguished as the type *Gallæcola*, or gall inhabitants. This form is not so destructive in its effect as the type *Radicola*, which inhabits the roots, and there produces effects and results very similar to those produced in the leaves by the other variety. This latter form, attacking the younger rootlets first, gradually, as it increases in numbers, attacks the larger roots, and, producing decay, soon exhausts the plant and produces a stunted growth, and, sooner or later, death.

Early in June, we may note on the leaves the peculiar galls formed by the insects of the first-named form. They are cup-shaped and of various sizes, but retain their shape even with the extremes of size. Fig. D shows the diseased leaf. In the latter figure, *c* shows the egg, *d* a section of one of the galls slightlymagnified, and *e* a swollen tendril. Saunders writes : "On opening one of the freshly-formed galls, it will be found to contain from one to four orange-colored lice, many very minute, shining, oval, whitish eggs, and usually a considerable number of young lice not much larger than the eggs and of the same color. Soon the gall becomes over-populated, and the surplus lice wander off through its partly-opened mouth on the upper side of the leaf and establish themselves either on the same leaf or on adjoining young leaves, where the irritation occasioned by their punctures causes the formation of new galls, within which the lice remain. After a time the older lice die and the galls which they have inhabited become flattened and almost obliterated. Hence it may happen that the galls on the older leaves of a vine will be empty while those on the younger ones are swarming with occupants."

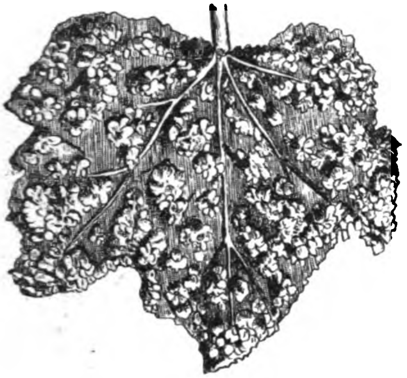
It is noted that the galls are usually most abundant on the Clinton vines, and, when very plentiful, cause the leaves to die and fall off. Several generations (some writers state five) are formed during the season, and the stronger of the last generation find their way to the smaller rootlets and by the end of September the leaf is deserted. The punctures of the insects on the roots not only cause the formation of galls, but also cause decay, which extends to the uninjured portions and soon involves enough of the underground structure to very materially injure, and, eventually, kill the plant.

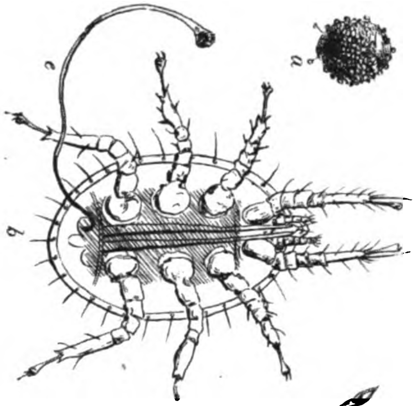
In Fig. A, *a* and *b* represent the upper and lower view of one of the lice of the first type alluded to, and *g* and *h* the mature egg-laying lice, upper and lower views.

In Fig. B, *a* shows a healthy root of a Clinton vine ; *b* shows another root of the same vine attacked by the lice (type *Radicola*); *c*, a root which has been deserted by the lice because it has not enough of the sap left for their sustenance ; *d d d* indicate how the lice are formed and attached to the roots ; *e* shows the female pupa ; *g* shows a dorsal view of a winged female, the line at the side showing her natural length.

During the first year of their attack, the vine does not show above ground, the damage being done below, and it is only when they exist in sufficient numbers to absorb so much of the juices of the plant as to affect the leaves and tendrils that their presence is noted ; this is usually during the second year of their attack, when the vine begins to assume a "sickly yellowish" color. An examination of a dead vine will usually fail to show any lice, for, before the plant has been so injured as to cause death, it has ceased to afford them sufficient food, and they have migrated to other and more satisfactory quarters on adjoining vines.

Of its many changes, Saunders writes : "The complete life history of this insect is extremely interesting and curious, and those desiring information as to the different modifications of form assumed by the insect in the course of its development will find it given with much minuteness in the fifth,

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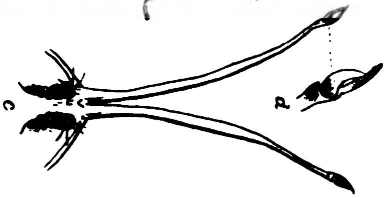
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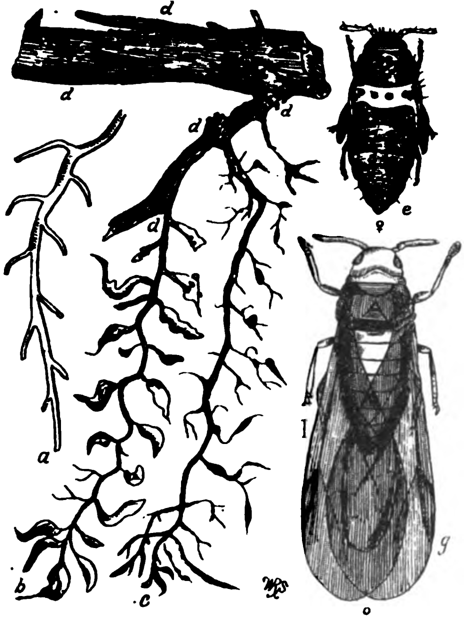
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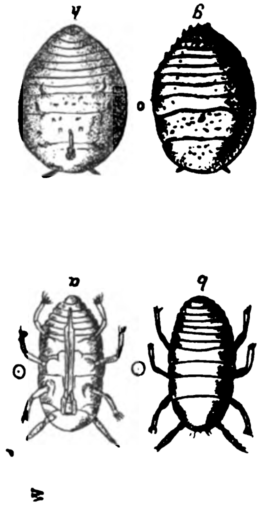
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sixth, seventh, and eighth 'Reports on the Insects of Missouri,' by C. V. Riley."

Numerous remedies have been tried, and in Europe a large amount of money has been expended by the French and German governments to discover a remedy which, while it is cheap, is at the same time efficacious. Flooding the whole vineyard during September and October has been practiced with good results, but is, of course, applicable only to limited and favored localities. The application of bi-sulphide of carbon, poured in holes made in the soil near the affected roots, thus far seems to give the most satisfactory and practical results ; by its rapid evaporation, the liquid instantly destroys all insect life with which the vapor comes in contact. Alkaline sulpho-carbonates have also been recommended, and have been tried with some degree of success. Carbolic acid mixed with water, in the proportion of one of acid to fifty of water, has also, in some cases, produced good effects. Soot strewn on the surface is also recommended as valuable and efficient.

ABORTION AMONG DAIRY STOCK.

The gradual and steady increase of abortion among dairy stock of the State has been the cause of much correspondence during the past year, but we regret that we are still compelled to report that we have, during the past year, made little, if any, advance in an investigation as to its cause, or in an attempt to obtain reliable information in regard to its cure or prevention. The investigations and "facts" of one year are overturned and rendered null and void by the discoveries of the next, and it would seem that, in our pursuit of knowledge to this difficulty, we travel in circles, sooner or later returning to the starting-point of a few years before.

At a recent meeting of the Board, Prof. R. S. Huidekoper (Professor of Veterinary Science at the University of Pennsylvania), consulting veterinary surgeon of the Board, in referring to abortion, used the following language:

"Abortion in cattle is to-day one of the most interesting, and, at the same time, most difficult questions that we have in the medicine of animals. I think that abortion in cattle is too generally supposed to proceed from but one cause. There are at least two distinct classes of abortion—the one sporadic and the other a contagious form. For instance, in one case the cattle are moved to another farm, have a violent change of food, are over-fattened, are fed too strongly with food of an oily nature, are forced into a constant change of food—and thus produce a number of abortions incidentally.

"Besides this, we have another class of abortions which are doubtless contagious in their nature. A cow comes on a farm and aborts, and that abortion extends to other cows hitherto free from it, and perhaps will remain on that farm for years.

"The peculiarity of this form of abortion is that cows aborting for the first time are in early pregnancy, and after the farm and buildings have been infected by a new cow; in several years they will carry their calves until nearer their natural time, each year a few months longer, and finally they carry them to the full natural time and abortions cease in that dairy.

"The handling and treatment of aborting cows must be varied, as the cause comes either from over-feeding or contagion, and the same rules of treatment cannot be applied to both forms. In all cases of abortion, the fœtus, as it is delivered, should immediately be carried off, and either buried or burned, and the stalls thoroughly washed, and the cow moved away from the other animals. Assuming that it may be a case of the contagious form, the only treatment that has ever been effectual is the treatment by tar-water, and the internal use of balls of tar and hypersulphate of soda, fed to the cows every second day, especially during the first few months of pregnancy ; this is perhaps the only treatment which has proved at all effectual. Next the thorough cleaning of all stables, racks, &c. Of course, with the other form of abortion, the proper remedy is not to change the character of the food nor the surroundings of the animal too suddenly.

"I have but just returned from a farm on which they had a large number of abortions during the past three years. Just at the time I was called on, there had been a new barn finished, and the cows were ready for removal to it. I expected that the change to the new barn would free them entirely from the trouble, but, as the owner wanted them treated, I gave them the ordinary treatment. The contagion was stopped, but I do not think that the treatment had much to do with it—the movement had destroyed, by removing it, the effects of the contagion.

"In very precocious cattle, cattle that are forced, and inbred cattle, there is a much greater tendency to abortion ; then, too, the habit of keeping them in close and warm stables has the same effect : that of rendering them precocious and more subject to abortion. I do not think that feeding with warm or steamed food would be an immediate cause of abortion, at least not beyond the fact that steamed food forces the animals to either fat or to milk, and produces looseness of the tissues, which is not in any case advantageous to the future health and reproductive powers of the animal ; exercise and ordinary food are much safer for growing and breeding animals. Simply regarding the cow as a mere machine for making milk, warm or hot feed is the proper kind; but for the reproduction of the race, and for general health, it is injurious."

As the result of our correspondence and investigations, we may attribute all cases of abortion among dairy cows to one of the following causes, viz : *Accident*, *Disease*, *Sympathy*, or *Ergot in the hay or straw.*

Accident.—There are many ways in which abortion might, and no doubt is, caused by accident ; slipping upon wet floors, running by dogs, any accidental fall, chaseing or blows from the master cow of the herd, kicks from the attendant, and blows of any kind, may all cause the difficulty to which we allude, but in none of these cases, and from none of these causes, would we expect it to assume a contagious form ; but there are practical men who claim that, having once been started in a dairy by accident, it may at once assume the contagious form, but the writer has not thus far been able to trace a single case of the clearly contagious type to any such cause. In a stable containing three heifers, all in calf at about the same time, to the same bull, one got loose, and, in trying to get out into the yard, became fast under the gate, and remained in that situation until released in the morning. All were within two months of calving ; the one which got fast aborted before she was found, and one of the others aborted before morning, while fast in her stall. The second case, no doubt, was caused by fright at the noise made by the animal fast, and not from contagion or sympathy. Both recovered in a short time, and no other animals in the large dairy were affected, nor did the mishap in any way interfere with the subsequent breeding from these heifers. Prof. Williams, of England, mentions a case where a heifer, which was being examined by a class at the university, was rather roughly examined by the students, in order to ascertain whether she was with calf, and aborted the next night. Cases of this kind are too numerous to mention, and special cases have been developed in the experience of nearly every dairyman in the State; the remedy is, of course, to avoid any cause which may possibly lead to such results.

Disease.—The experience of the writer in the suppression of contagious pleuro-pneumonia clearly proves that all animals affected to any great extent with the disease will abort shortly after it reaches its maximum of inflammation. In nearly all large dairies placed in quarantine by the State authorities, abortions from disease have been noted, but, so far as can be ascertained, none of them assumed a contagious form, unless the trouble had existed in that form before the innoculation with the disease.

In a lecture, in which he refers to the effect of disease in causing abortion, Prof. Williams uses the following language:

"As foot-and-mouth disease, tuberculosis, diarrhœa, or any medicine or disease that acts violently on the bowels, will induce abortion, purgatives by stimulating peristaltic action excite a contractile action of the uterus, and abortion may ensue. When once even an accidental abortion has taken place in a herd of cattle, what may be called an epidemic of abortion may set in, and one after another, perhaps the majority, or all the cattle in the place will abort. The question here is, How does this come about? Roloff, Haubner, Bouley, Franck, and other Continental observers, are of opinion that a micro-organism similar to *Leptothrix Buccalis*, or that found in the mucous membrane of the mouth, is found in the discharge from the vagina. This, they believe, increases toward the parturient period, becomes very numerous in the discharges from the vagina of the cow as she approaches parturition, becomes infective, and spreads the contagion. This organism is always found on the membrane of the vulva, and is supposed to induce decomposition of the fœtal membranes. By smearing the vagina of a pregnant cow with the discharges of an aborted cow, or expelled fœtal membranes, abortion has been induced by Roloff, and he is of the opinion that he has ascertained that it is induced by something which finds its way to the uterus through the vagina, and that infective matters are found on the articles soiled by an aborted cow, as well as in litter. He also believes that he has found that the accident always occurs in byres where the drain is small, and where there is insufficient fall for the excretia, and where the hind-quarters of the cattle are readily soiled. The fœtal membranes are generally retained for a time, and some maintain that the putrefactive products evolved from their decomposition cause abortion, and believe this to be due to the entrance of these into the vagina. Others think that the infection is conveyed through the air into the lungs and thus infects the cattle.

"I am of opinion, gentlemen, that this view of the matter held by the Continental veterinaries is defective, because if there were a micro-organism operating, as they believe, on the fœtal membranes, these would be found dead and decomposed at the period of abortion. But you are aware that the fœtal membranes are, as a rule, not decomposed; are retained, and generally expelled only when they have undergone decomposition, and that there is a smell from the fœtal membranes. I will not assert that the entrance of organisms, arising from this decomposition, into the fœtal membranes of another animal may not induce the abortion of a cow which has been in contact with an aborted cow; but, in the great majority of cows, the fœtus is dead and undergoing putrefaction before being expelled, and that before expulsion we find that the fœtal membranes are retained for a considerable time. If the entrance of the organism through the vagina on to the fœtal membranes of the pregnant animal were the cause of abortion, we should certainly find the fœtal membranes in a state of decomposition or degeneration before the cow had aborted, and that the death of the fœtus would be due to the degeneration of the fœtal membranes, the fœtus itself coming away, not dead, as is generally the case now, but either very lately dead or altogether alive. This fact, therefore, forces us to the conclusion that when an exceptional abortion occurs, it may—in fact it becomes—infective, by what would be looked upon as being the sympathetic influence of the smell arising from the decomposing fœtal membranes and discharges from the vagina."

Observation convinces us that any disease or combination of diseases which weakens the system and reduces the vital power may cause abortion. Local injuries which involve confinement or deprivation from exercise—as a broken leg—have and may cause abortion; not at first from the direct result of the accident, but afterward, when the system has been reduced by the struggle of nature to repair the injury. An overdose of cathartic medicine, by producing an unnatural and diseased condition of the system, may produce abortion. It is possible that an exclusive diet of wheat-bran, by producing a relaxed condition of the bowels, may pave the way for this disease. Heavy and long-continued milking close up to calving, by compelling double duty from the system, may, and no doubt often does, cause abortion. Whether these forms of abortion can become contagious is somewhat a matter of dispute, as many claim that the contagious form is a specific one and cannot emanate from any other.

Sympathy.—If, from any accident, a single cow in a herd drops her calf prematurely, it is often the case that others having immediate access to her, or to the aborted material, will at once drop their calves, often by the side of the first abortion. These are cases which may be very properly said to arise from sympathy, and it is questionable whether they ever "run into" the contagious form. In referring to this form of abortion, the authority whom we have before quoted alludes as follows:

"The very fact that there is an animal in the throes of labor in the byre excites the sympathy of the surrounding animals; and if, in addition to this sympathetic feeling, we have a smell from these fœtal membranes, the blood of the pregnant animals becomes altered, and, as a consequence, the calves die. A very little matter is sufficient to induce the death of the fœtus. Koch has proved that it is not necessary to have an organism to destroy life. By creating a stink—if I may so term it—by making beef-tea, and exposing it to the ordinary atmosphere for four or five weeks, and using it for the purpose of inoculation, destroying life without producing an organism in the body of the animal, by applying it in the ordinary method of inoculation. Death in such cases is considered to be due to the peculiar poison, pepsin, which is perfectly independent of the micro-organisms contained in the beef-tea. The inhalation of putrid matter by cows in cohabitation with an aborted cow is sufficient to induce such an alteration in the blood of that animal as even to cause death to the fœtus. I cannot, therefore, accept this theory of the entrance of a micro-organism into the vagina of a pregnant animal through the vulva as a cause of abortion, or as being the cause of the spread of the disease.

"I look upon the spread of abortion as a result of an influence upon imagination, or upon the blood by smell. In proof of this, I know of a case in which abortion occurs to the cows of a nobleman in the south of Scotland. This has occurred only since he built some kennels for his fox-hounds near the byres. The smell of the meat, etc., has had this effect.

Prior to the kennels being built, abortion among the cows was not known, but since, a great majority of this nobleman's cattle abort every year."

Nervous, high-fed, heavy milking cows will sometimes drop their calves while a cow near by or in sight is undergoing parturition in the natural way. In more than one case the writer has known this to occur when the aborting animal could not, by any possibility, have seen the other, but was influenced by sounds, and, possibly odors. In fact it is impossible for any one to say where the result of abortion caused by sympathy may not run, but that they will assume the contagious form when all of the producing causes have been removed is not yet clearly proven; that they do not occur a second time with the same animal, except with a repetition of the cause, seems to prove that such cases do not assume the contagious or infectious form.

High Feeding.—When the animal is forced into an unnatural condition by large amounts of food, which is often of a laxative nature, abortions will occur, even with the greatest precaution upon the part of the dairyman. The use of large amounts of wheat-bran will, no doubt, produce in the systems of some animals conditions which, to say the least, are conducive to abortion, and which may possibly be the prime cause of it; oil-cake, if fed in large amounts, or if fed at once in even reasonable amounts, will produce a similar condition, and, no doubt, similar results. Large feeds of roots, given before the system has been gradually prepared for them, may produce abortion; even the sudden change from one kind of food to another, even though both under other circumstances would be proper and safe, is no doubt another cause of the trouble. The feeding of distillery slops produces a condition of the system which, in animals of a certain temperament, is liable to cause abortion, especially if kept up with the same animals for several years. No matter how this peculiar condition of the system may be produced, the result is the same, and may be attributed either to high feeding or errors in feeding. In his reference to this form or cause of abortion, Dr. Williams uses the following language:

"The next cause is high feeding and want of exercise. This, undoubtedly, induces abortion. The influence of high feeding on the digestive apparatus is to cause it to become disordered, and then there ensues a malcondition of the blood, and in the majority of these cases the blood of the animals is found to be altered in its constitution and aplastic. Animals stimulated with a high diet, and never, or scarcely ever, having any exercise, have also, in some degree, a plethoric condition of the uterus, or congestions leading to slight extravasations between the maternal surface and fœtal membranes. The fœtal membranes then become detached, and begin to degenerate. Again, the detachment of the fœtal membranes from the mother will cause a loss of nutritious supply to the fœtus. There is an insufficient quantity of blood sent to the fœtus, and, as a consequence of this lack of blood-supply, the fœtus dies, and abortion is induced. We know that, in the human female, abortion is looked upon very often as being due to fatty degeneration of the fœtal membranes, owing to imperfect, insufficient, or improper supply of blood. I am of the opinion that high feeding of cattle, inducing a plethoric condition of the mucuous membranes of the uterus, and by bringing about the detachment of the fœtal membranes, causes abortion. In the second place, when the blood is aplastic, it contains too few of the elements which give it plasticity, and, as a result, the fœtal membranes, as well as the fœtus itself, suffer from an insufficient or improper supply of blood, and there is a tendency to abortion."

Ergot.—All grasses and most grains, under a peculiar combination of circumstances of moisture, fertilization, and heat are liable to produce a fungoid growth known as ergot. The extent to which this is formed in one crop may be estimated by the presence of "smutty ears" or abnormal ears in corn; in rye the ergot growth takes a more solid form, and is found in large grains as hard as the grains of rye; on many of the grasses it takes a somewhat similar form in connection with the seed, but being much smaller than in the two cases which we have mentioned, usually escapes the notice of the dairyman; and many who suppose that they are feeding perfect hay are, in reality, feeding hay upon which this abnormal growth exists to an unsuspected extent. When taken internally, the effect of all of these many forms of ergot is to produce an excited condition of the reproductive organs, which, in many cases, leads to abortion. In recent outbreaks in Kansas, much more serious results, and even death, followed the consumption of hay having in its partially ripened seed large amounts of ergot. It is probable that there is no species of grass or grain free from this kind of growth; but in our grains its existence is so plain and the mode of harvesting so arranged as to bring it into notice and lead to its exclusion as stock-food; but in our hay-making grasses this is not the case, and there can be little doubt that many cases of abortion could be traced to this cause. All cows seem to have an unexplained liking for the ergot or "smut" produced on corn, and in husking usually left with the fodder, and the writer has often noticed them move over a whole bundle in search of this material. Just how much must be eaten to produce the bad result has not been shown by experiment, but that enough may, in certain cases, be obtained even from corn-fodder is possible. Nor is this danger confined to hay and other dry fodders. A leading English authority thus alludes to the possibility of danger from another and hitherto unsuspected source, in the following language:

"I would now call your attention to the use of ergotized food. This matter should be carefully investigated. I may also state that many compound cakes as made now-a-days are very impure. You will find, if you mix a certain quantity of cake in a little warm water, that in the course of a *minute or two* it is swarming with micro-organisms. The bad condition of the blood of cows, no doubt, is, in many cases, brought about by the entrance of these organisms into the system. A remarkable fact in connection with this matter was revealed in New Zealand, where, until 1875, abortion was unknown. In that year, however, rye-grass being introduced, and it becoming ergotized, abortion became prevalent, and there was tremendous loss in consequence all over the colony. It is also well worth considering what influence such food as frosted turnips has upon the animal. During wet or damp seasons, too, abortion is much more prevalent than during dry ones, and those interested should endeavor to investigate this subject. There is another thing which some of you may look upon as an absurdity, but which I regard as one of the influences that induce abortion. We find, particularly in cows that are very highly fed, that they suffer from irritation of the throat, arising, most probably, from a condition of indigestion, which causes a long, powerful cough, a cough which sometimes causes expulsion of fœces and urine. In some of these cases, where there is this condition of the blood, that very act of coughing may be sufficient to detach some of the fœtal membranes, and thus be one of the causes of abortion."

Prof. James Law, in his "Farmers' Veterinary Adviser," thus summarizes the causes which, in his estimation, may produce abortion:

"Blows or pressure on the abdomen, slips, falls, riding animals in heat, diseases of the abdominal organs, tympanitis, from wet, frosted, or musty fodder, inflammation of the bowels, diarrhœa, poisoning by irritants taken with the food or otherwise, *renal calculi* or other diseases of the bladder, stalls too much inclined backwards, over-feeding, plethora, hot, damp, relaxing stables, severe muscular exertion after long rest, exhausting, feeding for milk at the expense of the system, breeding at too early an age, proximity or contact with slaughter-houses or dead and decomposed animal matter, especially the abortion discharges of other animals, drinking putrid or iced water, disease or death of the fœtus, feeding on ergoted grasses or smutty wheat or corn, and, finally, the presence in the passages of a microscopic vegetable parasite, (*Leptothrix vaginalis*,) which is easily transferred from one animal to another so as to produce abortion."

A careful examination of any or all of the recognized authorities of the day will lead the reader to observe the stress which is laid upon the existence of a foreign microscopic growth in cases of contagious abortion, and, reasoning from this, many have assumed that the existence or non-existence of this growth is the test of the contagious nature of the special case, or, in other words, that abortion does not become contagious or transmissible until this growth is present, and that in cases produced by accident, and in all cases not contagious, this growth does not exist. If this reasoning can be accepted, it will account for many of the hitherto unexplained but admitted facts in connection with this dairy trouble. If this growth does exist in all the contagious forms of the disease, and if it is transmissible, as claimed, from animal to animal, by mere contact with the aborted matter, then we are in a fair position to solve the problem of the cause and cure of abortion. That this microscopic growth does exist in very many of the cases of abortion is undoubted and admitted; but is it the cause or the effect of the disease? Does the growth cause the abortion, or is it the result of the abortion itself? These are important questions which the near future may solve for us, and are but one of the many forms in which science may do much to assist practical examination; if, by a system of inoculation, the disease can be caused in a healthy animal by the introduction of the germs, as is the case with contagious pleuro-pneumonia, (lung plague,) chicken and hog cholera, and other diseases, then we may accept the theory, but thus far we have not sufficient practical data to warrant its acceptance or rejection. With the light which we now have, the theory seems to be plausible and supported by scientific research.

THE CURL IN THE PEACH.

By Thomas Meehan, *Botanist of the Board.*

The immediate cause of the curl in the peach-leaf—known as the curl-disease—is the growth of a small fungus known in science as *Ascomyces deformans.* This fungus, like so many of its class, is so small that its development can be traced only by means of a powerful microscope. These small plants, known under the general name of fungi—the plural of fungus—may have their growth illustrated in some degree by what we see in the common mushroom. The real mushroom plant consists of a white, cobwebby set of threads, which have a musty smell and live under the surface of the ground, feeding on the partially-decayed vegetable matter it finds there. The threads are the branches of the plant. They extend from year to year, the youngest growth living over to start the new growth of next year, the older portion of the season dying before the year closes. This thready growth is called the *mycelium*, and, for anything we know, it may continue to exist for centuries. Gardeners call this *mycelium* spawn, and spawn, kept wholly dry in bricks made of clay and horse-manure, has been known to grow and produce mushrooms for at least a quarter of a century after the bricks were made. This fact shows that plants of fungi may exist without showing any external evidence that they are there. The mushroom—the edible part of the plant—is equivalent to the inflorescence or flowering portions of the higher order of plants. When mature, it produces spores, which are the equivalents of seeds. These blow away, and may originate new colonies a long distance away, and where propagation by means of the underground threads or branches could never reach. Now, we all know that seeds will not grow unless they get the conditions of heat and moisture necessary for each species. The seeds of chick-weed and other weeds will sprout when the thermometer is but just above the freezing-point, while corn and lima beans will rather rot than sprout unless the temperature is near sixty degrees. Each kind must have its exact conditions before it grows. This is true of the spores or *mycelia* of fungi, only probably more so. From experience in the growth of the common mushroom, we see that, though the spores must be everywhere, it is only in selected spots that we find "mushrooms," and it is only in occasional seasons that they are abundant. Some years there are scarcely any, and yet we must remember the material from which they are made is just as abundant in the seasons when they are almost absent as when they are the most abundant. In short, the peculiar and rare conditions are absent in seasons when mushrooms are scarce.

Coming back to the fungus that causes curl in the peach, its home is in the tissue of the peach, but it only luxuriates when some circumstances favor its growth. Just what these circumstances are has never been definitely ascertained. Where there is a regularly warm temperature from the commencement of growth the conditions are unfavorable, for we rarely hear of the curl in the Southern seaboard States, and it is conceded that it never happens when the trees are grown under glass, as some gardeners do. It is not very troublesome in localities just between the Northern and Southern line. The growth is very virulent in Canada, and in some parts of California of late years it has been terribly destructive.

But, some may say, what evidence is there that it is a fungus? Why may not the change of temperature injure the trees and cause the blisters, and fungus have nothing at all to do with it? Simply because we find that a new variety will not curl, though in a district where others curl, though it is under exactly the same conditions of climate, until a few seasons elapse. By that time the fungus plant has had time to get into its tissues, and be ready to develop whenever the favorable conditions come. Then we are continually sending peach trees from the North to the South, and into houses to grow under glass, which must, in every probability, have the germs of the fungus in them, and yet they do not develop, because the required conditions are not there; and, again, because in whole districts, as in California, where for years the curl has never appeared under many seasons, it appears every year now on the older varieties. There can be no doubt, in short, that the small fungus referred to is the actual cause of the peach curl.

What is the remedy? Surely, nothing absolutely certain, because we cannot control the atmospheric conditions as we could if a peach tree were growing in a hot-house. But we can mitigate the trouble to some extent. We should never propagate, if we can help it, from a tree that has once had the curl, because the plant or the spores will most likely be in the tissues of the tree, and we may be watching for new and good varieties, because it takes some time before the fungus plant gets into a tree, so as to be spread much by propagation. When once a peach tree has the curl badly, the sooner we replace it by a tree free from the fungus plant the better. There is no way to get it out of the tissue, and at every recurrence of the favorable climatic conditions, a crop of curl will surely come.

The injury from curl is always in proportion to its virulence. The injury is simply from the loss of leaves. The blistered portions do no effective work in preparing the plant food for future growth; and, where the leaf is badly blistered, it seems as if conscious of its uselessness, and soon falls off. If only a few fall, there may be enough to carry on the work for the tree fairly well. But if most are blistered and fall, a new crop of leaves has to be made out of material that should rather be stored up for the nourishment of the tree, and the half-starved branches die during the following winter, or often, in bad cases, before the summer season is over.

A tree must have healthy leaves, and a full season of active work for them, in order itself to continue long in perfect health.

QUESTIONS THAT ARE ASKED ABOUT FERTILIZERS.

By Prof. W. H. JORDAN, *Chemist of the Board.*

A discussion of questions pertaining to fertilizers is of general interest to farmers. They are questions that have been treated at length, and are those about which I have had occasion to say a great deal in one way or another within the past few months. I have not come at this time to present a formal paper on the general subject, but to make such remarks as I shall be able, that will possibly draw forth questions and a general discussion of some of the points involved, on the part of farmers and others present here. I say that the questions pertaining to fertilizers are important, and are involved in the interests of farmers and of society as a whole. They are questions that have some relation to the general financial and business conditions of the country. Of that I have nothing to say, but my purpose is to speak for a few minutes upon the questions that farmers are apt to discuss concerning commercial fertilizers. All questions cannot be answered. Farmers can ask questions that no man can answer. We have been talking about the experiments with fertilizers, and the right course to pursue, until he that wants knowledge from the scientist is led to expect too much. We cannot answer everything completely. We have a great deal to learn, and, at the same time, we cannot learn too much.

There is one fertilizer that has been used for years, and that is barn-yard manure. There is not a farmer in this State but has a great deal of faith in the effect of this sort of manure on his soil. It has been only since about

1840 that we have had these "new-fangled manures," and farmers have been slow in learning about them. When commercial fertilizers first came about, farmers considered them a sort of medicine with which they were to doctor the soil. But we have learned a great many facts, and to-day the knowledge of commercial fertilizers is on a good basis. One of the first points to consider, as a basis for discussion, is, "How do commercial fertilizers compare with barn-yard manure?" "In what do they differ?" A pile of yard manure, in unfermented condition, as it is made in Pennsylvania, with a great deal of straw in it, and weighing three thousand five hundred pounds, contains two thousand seven hundred and twelve pounds of water, which is not of great fertilizing value. The analyses that have been made of the various kinds of yard manure show the amount of water contained to be from sixty to seventy-five per cent., and so ordinary barn-yard manure is about three fourths water. So much, then, of the thirty-five hundred pounds is accounted for. Seven hundred and ten pounds of the rest of it would be organic matter, or material that you can burn. The remainder consists of about seventy-eight pounds of material that you could not burn away, of mineral matter, which corresponds very closely in composition with the mineral matter that is in ordinary commercial fertilizers.

One hundred pounds of a commercial fertilizer, consisting of a mixture of sixty pounds of dissolved bone-black, twenty pounds of sulphate of ammonia, and twenty pounds of muriate of potash, would contain about the same amount of mineral matter as the quantity of yard manure mentioned, and this mineral matter would contain almost the same ingredients, though in somewhat different proportions.

A commercial fertilizer, compounded as I have indicated, would contain nitrogen, and the ash or mineral matter of yard manure is destitute of this ingredient. The nitrogen of farm manures is contained in the organic portion, or that which can be burned away; so that if we put the nitrogen of the seven hundred and ten pounds of organic matter contained in the thirty-five hundred pounds of yard manure with the seventy-eight pounds of mineral substances, we would have a fertilizer very similar to the hundred pounds of commercial fertilizer of the kind indicated.

It is often said that yard manure is a complete fertilizer, which is one of the arguments put forth in favor of its use as against commercial fertilizers; but many commercial fertilizers are just as complete plant-food as is barn-yard manure. I am not making an argument against barn-yard manure, but state the facts as they are.

In comparing the valuable ingredients of the thirty-five hundred pounds of yard manure with a quantity of commercial fertilizer that would contain about the same amount of mineral matter, (the hundred-pound mixture suggested,) I find that the yard manure would contain more nitrogen, more potash and magnesia, but less lime, and very much less phosphoric acid and sulphuric acid. The nitrogen of the particular commercial fertilizer used for comparison here is in the form of a mineral salt, while in the yard manure it is in the organic form. The phosphoric acid is mostly soluble in the commercial fertilizer, while in the yard manure it is not. Both fertilizers, however, are complete fertilizers. The great difference between yard manure and the complete fertilizer is that the former contains a great deal of organic matter—that is, material that can be burned—and the latter does not, and the question is often asked: "Is not that organic matter a very essential thing on our land?" "Is it not essential that we should apply a great deal of organic matter?"

This organic matter has certainly a very important influence on the soil.

It has a tendency to make heavy soils light, and to make dry soils retentive of moisture, and to make the soil warm, because of the change of color. That organic matter is a very essential constituent of soils is not to be doubted. But here comes in a point, about which I was speaking on the cars this morning, coming to the meeting: "Do we not, by our ordinary methods of farming—taking the ordinary rotation of crops, including wheat, corn, oats, and grass—do we not, in turning into the soil the roots and stubble of these crops, and allowing them to decay, furnish our fields with all the organic matter they really need?" The final decay of the roots of the wheat, the corn, the oats, and the grass, in this rotation, is very advantageous. Estimates have been made of the weight of the roots of clover, and other crops, in an acre of land—the weight of the roots and stubble that are turned under. In various experiments that have been made by digging around and separating the roots, it has been found that the roots and stubble varied in weight from fifteen hundred to six thousand pounds per acre. That all decays in the soil and furnishes a great deal of organic matter. There is a large amount of material turned under which may amount to several tons per acre, and it is possible that we can get along without the organic matter of the yard manure, and supply the plant-food in another form. If the material of commercial fertilizers is just as much plant-food as that contained in barn-yard manure, then the question comes: "Can we farm continuously by the use of commercial fertilizer and not use yard manure?" We shall have to get our answer from experience, if we get it anywhere. I can point to one instance of the continuous use of commercial fertilizers for a long series of years. I was talking this morning about the experiment station of Lawes & Gilbert. They began with experiments on commercial fertilizers a number of years ago, and, lately, have been getting out a very valuable summary. The yield of the land when they took it was about the same throughout. They put at the rate of forty thousand pounds of manure per acre upon some plots of ground, and upon others they used commercial fertilizers. The yield on those plots where they grew crops from commercial fertilizers has been as large, or a little larger, than where they used yard manure. This is an important fact with reference to some experiments that have been carried on over thirty years.

I have had occasion to notice, within a short time, the effect of some commercial fertilizers that have been used for a few years at the college. We have a series of plots on which we carry on a rotation of crops, manuring some with yard manure and others with commercial fertilizers. They are side by side. We have generally got as good crops, and a little better, from the commercial fertilizers as we have from the barn-yard manure.

I cannot point to many examples that have continued so long as to furnish a guide to farmers; but this question, it seems to me, is one of great importance to the agriculturist. That farmers can use commercial fertilizers alone, provided they frequently turn under a heavy clover sod, seems very probable. I know if a field is planted every year in potatoes, instead of retaining the proper material, the land would get sticky and runny. It needs organic matter to improve its condition. In the case of the market-gardener, when very little organic material is plowed under, stable manure is a necessity. The conditions are different with the general farmer.

Mr. JEFFERIS of Chester. On this supposition regarding yard manure, I would like to ask this question: If that yard manure is composed of the refuse taken from the stall, and exposed instead of being covered, the animals having been fed on straw or hay, would it be materially different from that where the animals were fed on grain, and passed in that style through those animals and turned into manure? Would not those fertilizers made in the dry and those kept entirely in the dry be quite different in the chemical result?

Prof. **JORDAN.** The gentleman's question involves several points. Manure that receives no rain, that just receives the water that is taken from the drink of the animals or urine, contains about seventy-five per cent. of water. You suggest a difference in the manure on account of the food that the animal eats. Manure from animals fed on hay and oil cake is much more valuable than from straw-fed animals—receiving no grain. I was just referring to ordinary yard manure.

Mr. **JEFFERIS.** One would be a complete manure of the very best elements taken from the soil, as I understand.

Prof. **JORDAN.** They would both be complete as to the kinds of ingredients, only one would contain more of certain things than the other.

Mr. **JEFFERIS.** You have all the constituents to make your complete fertilizer; but you do not take them to make life from the plant.

Prof. **JORDAN.** To continue, I want to touch next upon another point that is involved in this discussion. It seems to me that it makes a great difference what sort of fertilizer we mean when we talk of commercial manures.

Fertilizers can be divided into two general classes: those that are complete, or that contain all the needed ingredients of plant growth, and those that are incomplete, or that lack some of the important and essential constituents of plant-food. Yard manure, and a commercial fertilizer similar to the mixture that has already been mentioned, are examples of complete fertilizers, while plain dissolved South Carolina rock is a good example of an incomplete or partial fertilizer. The latter contains an insignificant amount of potash and no nitrogen. It is a partial fertilizer in the sense of being unable to supply these ingredients.

Yard manure is the result of decomposition of plants, and therefore contains all the ingredients from which the plants grow. One kind of stable manure may contain more of certain material than another kind, but both contain the same ingredients. South Carolina rock does not contain all the elements from which the plant grows, and, as a result, but partially serves the needs of plants. What is the result if I apply barn-yard manure? The result is, I keep the soil well balanced. What is the result if I use a partial fertilizer? I may use South Carolina rock, which contains phosphoric acid as the principal ingredient, and that a valuable one. The soil I am cultivating may not need anything more to supply its deficiencies. But the plants are taking from the soil all the ingredients that are needed for their growth, and if South Carolina rock constitutes the only manure, the soil must constantly be growing poorer in, or less able to supply, certain ingredients, whose loss is not made good by the manure. Thus, if we use continuously a partial fertilizer, the results may be very different than where a complete fertilizer is used. So we may need to resort to complete fertilizers in the end. Our friends may look at the financial side of the question and say, "We cannot afford to buy that which the soil does not need, simply because it may be needed some day in the future. We will furnish what the soil does need, and wait until it needs the other." I simply place before you what may be the result of partial fertilizing. I have not the slightest doubt that the ultimate effect will be quite different from the use of dissolved bone-black, or dissolved South Carolina rock, which is a partial fertilizer, not containing potash or nitrogen, and the use of a mixture of dissolved bone-black, an ammonia salt, and a salt of potash, because one furnishes only some, and the other all the kinds of material needed in plant-food. I am quite willing to believe that dissolved bone-black may often be more profitable for a time than the use of the mixture, because the cost of the latter is much greater, and in some cases without a proportionate increase of crop.

Another point is worthy of attention, and that is the question of commercial fertilizers being stimulants. We say a substance is a stimulant when it causes increased use of material in the soil without making good the loss thus occasioned. While in this sense commercial fertilizers may have something of the effect of a stimulant, there is a sense in which they are just as true plant-food as yard manure, and the nutrition of plants is their principal office. Some ingredients have something of the effect of lime. Lime is a stimulant in the sense I have just indicated, and certain ingredients have a tendency to increase the use of certain soil material just as lime does. This is not, however, the principal use of commercial fertilizers.

Mr. **STEBBINS** of Chester. The gentleman has ruled that you can overdo the matter by putting commercial fertilizers on the land. Can we not overdo the matter by putting on too much barn-yard manure? Why is it that we put on any quantity of barn-yard manure, and it does not injure the ground, or prevent the growth of crops; but in putting on commercial fertilizers you may destroy the utility of the soil? How is that?

Prof. **JORDAN**. The gentleman is mistaken in saying that I stated we can put too much commercial fertilizer on the soil. Such a thing would be possible, of course. I am not aware that it is ever done. I have seen a thousand pounds per acre of the best fertilizer put upon land without bad effect. I do not understand how it is possible, by the proper use of commercial fertilizers, to injure the soil. I know of certain instances where farmers think they have injured their soil, but that was on the coast of Maine, where they have applied great quantities of the refuse from manufacturing fish oil, which furnished nitrogenous material to a very great extent, and very little of anything else. This fertilizer was only a partial fertilizer, and caused the soil to become drained of the available mineral plant-food. But if the soil is properly treated, there is no danger of a farmer injuring his land, provided that his general system of farming is good.

GEOLOGICAL THOUGHTS ON SOILS.

By Prof. J. P. LESLEY, *State Geologist and Geologist of the Board.*

In my intercourse with farmers, I have been surprised to see how many of them remain still unacquainted with the fact that the soil which they cultivate is directly derived from the rocks on which it lies; that is, a loamy, orange-colored soil over limestone rocks, a sandy, whitish soil on sandstone rocks, a dark clay soil on black slate rocks, a loose, glittering, dry soil on gneiss and granite rocks, a dusty, gravelly, pebbly soil on farms in the glacial drift region, &c. Of course there are a great many thoughtful farmers who have found all this out for themselves, by noticing the rocks in their neighborhood; but, so far as my experience goes, the majority of the agricultural citizens of the State seem never to have put the two things together—the rock which they blast to make a cellar, or which they quarry to burn or to build with, or which sticks out of their hill-sides on the bank of a stream, or the loose rocks which they haul off their fields and pile along their fences, and the soil which they plow. In talking with them, I get the impression that if they take any thought at all about the origin of their soil, they entertain the notion that it was made by a direct, separate act of God, and spread over the rocks, as a woman buys a carpet made in England or in Philadelphia, brings it home to her husband's farm-house in the country, unrolls it and tacks it down on the floor, merely to cover up the boards and make the room warmer. She has not the least idea how the carpet has been made, and does not care to know, provided the stuff suits her in color and will wear well, and the price is reasonable; and she would be very much astonished if she went into a house where a carpet made of spruce-pine fiber mash was spread on a spruce-pine board floor to see how different carpet and the floor *looked*, while in fact the one was made out of the other. And yet her husband and family are supported by farming a soil-carpet spread out over a rock floor, the carpet being made out of the floor.

All farmers know that they can get rid of any great, loose rocks which encumber their fields, by building fires around them and dashing cold water on them when they get hot, thus cracking them up in larger and smaller pieces, which can be easily handled and carted away. And those who have done this must have noticed that the heat and wet sometimes turned the broken pieces black, and sometimes turned them white, according to the kind of rock against which the fire was built; that in some cases the pieces fell down in square chunks, in other cases in sharp, thin splinters, and in other cases as a coarse sand; that, if the rock was a conglomerate or pudding-stone, some of the round pebbles would fall out and lie around loose, and, if it had veins of white quartz in it, it would split first along the veins, and the quartz of the veins would crack up into small pieces crosswise and separate from the rest of the rock fragments.

Now what it takes a farmer only a few days to do with a hot fire and dashes of cold water, it takes the gentle sunshine and warm rains tens of thousands of years to do; but nature has had plenty of time to spare for this kind of work, and has done it much more thoroughly than any farmer can, and has done it everywhere over the whole surface of the planet, so that all the rock formations of the world have gradually got a covering of soil, each kind of soil made out of the rock on which it now lies, and being originally of the same character as the rock, whatever that may be, whether slate, or shale, or sandstone, or pudding-stone, or granite, or mica-schist, or serpentine, or magnesian limestone, or pure limestone, or lava.

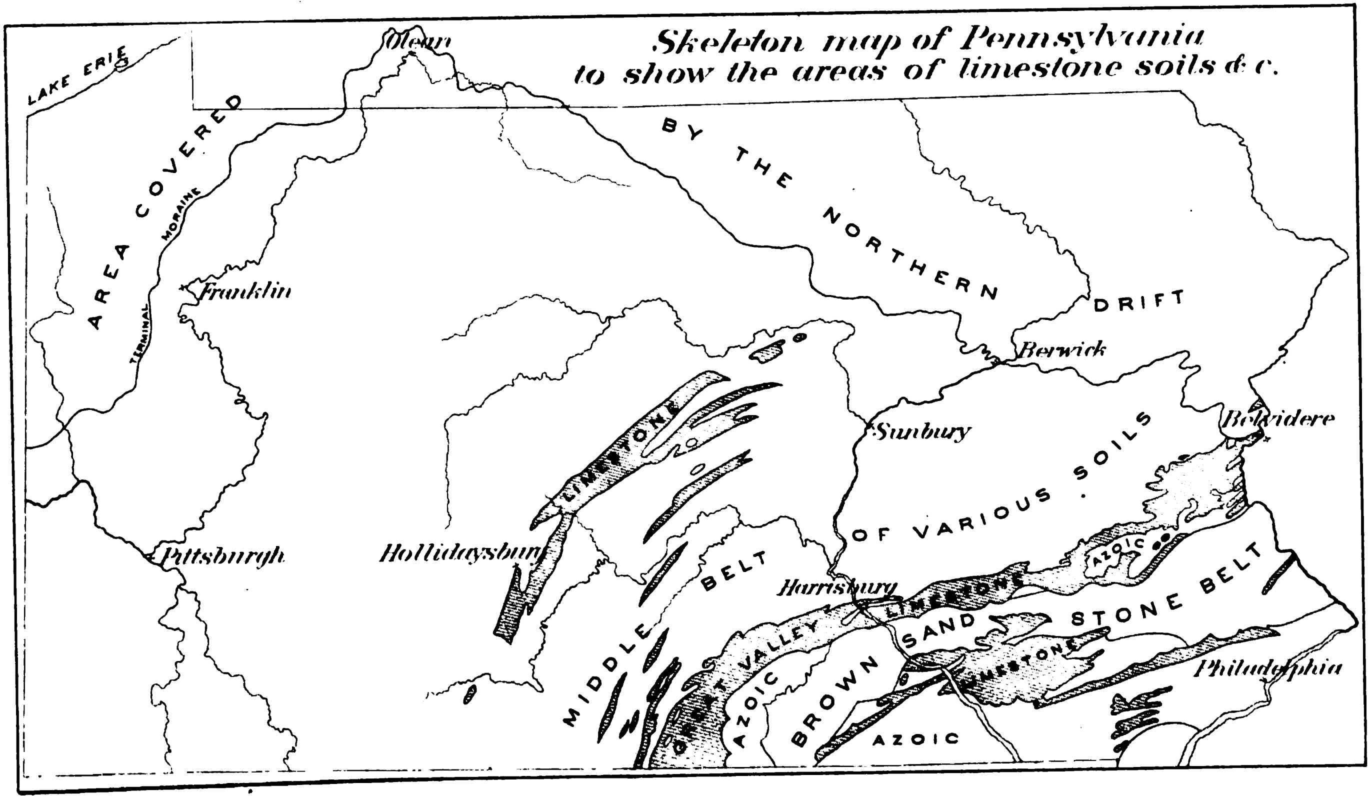
It follows that if the rock beds lie very flat over a considerable space of ground, then the soil which covers it will be everywhere very much the same, for it will be everywhere made out of the same kind of rock. This is the case, for example, with square miles of land on the highlands of the Alleghany mountain in Lycoming, Sullivan, Clinton, Centre, Clearfield, and Cambria counties, on the Broad mountain in Schuylkill county, where people are astonished at finding themselves traveling long distances over sea-sand, as if they were riding along the beaches at the edge of the ocean; and they ask geologists to explain how the ocean could have got up there, two thousand feet above the present tide level, to make that sand. But the geologist has only to point out to them the flat rocks of massive sandstone which appear here and there alongside the road, and blocks of which lie strewed about, and show them how the whole district is a flat table of that kind of rock, to satisfy them that it did not require the sea to be there to make the sand; for the sun's heat and the year's rains through many centuries have been quite competent to change the top layers of the sandrock formation back again into the loose sea-sand out of which it had been originally made, before the American continent was lifted to its present height. The winds, too, have a good deal to do with it; for when the sunshine has expanded the surface of the rock, and a cold dash of rain has contracted it again suddenly, tearing the sand grains apart, the strong winds sweep the little layer of loose sand grains into cracks and nooks and low places, leaving a fresh rock surface to go through the same process; and so in time the whole district gets buried under a carpet of sea-sand, through which the rain-water can still reach the rock surfaces, and carry on the work of slow destruction; dissolving the slight cement which holds the grains of the rock together, and loosening it into a sort of sub-soil to greater and greater depths, while the vegetation is forming a poor sort of soil on top, which more or less stops the wind-drift.

Such will be the operation in all parts of the country where the rock layers lie flat; and such also will be the operation wherever rock-formations are very thick, even if they do not lie quite flat, but are very much alike all the way through; as in the great red shale and mud sand country of Bucks, Montgomery, eastern Chester, southern Berks, and northern Lancaster, and York and western Adams counties. In spite of the fact that the rock beds dip five or ten degrees northward, bringing one after another to the surface, and in spite of some variations of red and gray beds, finer and coarser beds, making belts which run east and west, still, the whole formation is practically the same kind of rock throughout, over a region of say two thousand square miles, the soil of which is everywhere practically of the same character, more or less reddish, and more or less clayey, because the underlying mother rock is everywhere a reddish gray mud sand stone. So it is with the great Lehigh, Lebanon or Cumberland Valley, all the southern half of which has limestone rock covered with a limestone soil, and all the northern half of which has slate rocks covered with a slate soil; although both the limestone rocks and the slate rocks stand up on their edges; but then the limestone formation is enormously thick and is not sub-divided by sand rocks or clay slates; and the slate formation is still thicker, and has only a very few thin limestone beds in it, which do not make much show at the surface of the earth, and, therefore, make very little of its soil. And the same thing may be said of the general soil of South Mountains made out of crystalline mountain rocks; and of the soils of Delaware and Chester counties, and southern Lancaster and York, made out of crystalline flagstones, mica slates, granites, etc. Although the differences of soil are here considerable, yet there is a general resemblance among themselves.

But when we get into a country like middle Pennsylvania the whole picture changes. There, a great number of different formations, shale, sandstone, limestone, marl—red, gray, and blue—stand on edge, and run side by side, in narrow lines of hill and vale, twisting and turning, back and forth, among each other, each one making its own kind of soil, in a narrow belt along its outcrop, and all of them so narrow, that several totally different kinds of soil are often seen on one man's farm, crossing it in streaks; which do not always run straight, but often curve about through his fields according to the bendings of the underlying rocks; and a man must be a pretty good practical geologist to know all he would like to know about the changes of soil between one corner of his farm and another. the wet and dry places, the loamy and sandy places, the rich and poor streaks in the same field, and why he can always get a good crop here and is never sure about a good one there. If the soil had been made at a distance and brought and spread over the rock bottom of his farm it would surely be pretty much all the same sort of soil; but it is not; and if he wonders why it is not, a geologist can explain the reason by pointing to the very different kinds of rocks which underlie his soil. Let him break off specimens of these different kinds of rock, hammer them fine, and mix them with water, and he will soon see what different kinds of sand and mud he will make out of them; and a chemist will tell him that the inside nature of his rocks is just as different —and more different—than their outside appearance. Some will be limestone and others sandstone, as he can see at a glance. But some of them which look like sandstone, the chemist will tell him contain a good deal of lime, potash, soda, magnesia, iron, etc., which he cannot see with the naked eye. And some of his limestones will turn out to have as much magnesia as lime in them; others will have very little magnesia, but a great deal of alum, or rock crystal. Some will contain twice or three times as much potash or soda as others. Some will contain almost enough iron to make a poor iron ore; and others will hold the iron in various crystalline forms, like mica or hornblende, in very small particles too small to see unless he takes a microscope. Then, some of his rocks will have vast numbers of marine shells, which will help to lime the soil naturally: others will have the casts of the shells but not the lime of the shell itself: and others will not show any traces, or very few of these forms of ancient animal life.

The farmer in such a country must therefore expect his soil to be of a great variety of kinds, because it is all made out of the slow destruction of the underlying rocks, which are of so many different kinds, not only of hardness and softness, sandiness and muddiness, but of chemical composition; and this the geologist alone can explain.

There is a region of Pennsylvania which differs from all those described above so completely that nothing which I have said of them applies to it: I mean the great drift-covered region of the north-eastern and north-western counties. The soil of this region has nothing to do with the mother rocks of those counties, but is made out of the upper surface of a thick overcoat of clay, sand, gravel, and boulders, brought by ice from the North. This overcoat or loose surface deposit is a confused mixture of all sorts of rocks, some of them brought South only a few miles, some of them from the State of New York, and some of them from Canada. In places, it is one or two hundred feet thick, and in deep gorges even four hundred feet thick; but, taken by and large over the whole drift-covered region, its general average thickness may safely be stated at about fifty feet. Part of it has been washed away by the rains of many centuries down the valleys of the Delaware, the Susquehanna, the Allegheny, and the Beaver rivers and their numerous branches, and these rivers are still employed in washing it away; so that many, perhaps most, of the cobble stones collected at the falls of the Delaware at Trenton, for paving the streets of Philadelphia, are rolled down by river floods from the drift which covers the valleys and mountains of eastern Monroe, Pike, and Wayne counties. The north-eastern corner of Northampton county is covered with drift, and so are the sides and top of the Blue mountain from the Water gap west to Fox's gap. The Lehigh river brings down drift-sand and pebbles from the Pocono mountain north-east of Mauch Chunk. The Schuylkill river does not bring down a single pebble, because none of its head-waters reach into



Skeleton map of Pennsylvania to show the areas of limestone soils &c.

the drift-covered region. But the North Branch of the Susquehanna rolls down immense quantities from all parts of Luzerne and Lackawanna, Wyoming, Susquehanna, and Bradford counties, and the West Branch collects them from northern Lycoming and Potter counties and southern New York. The Juniata river, like the Schuylkill, drains a region which has no drift; but the northern and western branches of the Allegheny river flow through the drift-covered region of western New York, the north-west corner of Warren county, and a great part of Erie and Crawford county. The Beaver river pours great quantities of Mercer and Lawrence county drift into the Ohio river, which is gradually ground up into mud and carried into the Mississippi, and so into the Gulf of Mexico.

The southern edge of the drift-covered region is a well marked line which crosses the State of New Jersey from Amboy to Belvedere, and passes across Pennsylvania in an almost straight north-west direction through Northampton,' Monroe, Carbon, Luzerne, Lycoming, and Potter counties to Olean on the New York State line. All the surface of Pennsylvania north and northeast of this line is covered with northern drift. The line enters Pennsylvania again in Warren county and runs nearly straight south-west through Venango county, back of Franklin, and through Lawrence and Beaver counties into the State of Ohio west of Darlington; and so keeps on to the Ohio river above Cincinnati. The whole country northwest and west of this line is covered with the Canadian ice drift which has been brought across Lake Erie. Wherever the mother rock underneath the drift has been laid bare by the streams or in quarries, its upper surface is grooved and scratched at right angles to the great boundary line, showing the direction in which the ice moved which brought the drift. The fine drift seems to have been ground up more or less at the bottom of the ice, and the great blocks of Canadian and Adirondack rocks must have been carried in the body of the ice. The great ice sheet never reached further south than the border line, being melted away there as fast as it could move forward, so that a huge collection of rock-trash of every kind of rock material, fine and coarse, was dumped along its long front wall, and remains to the present day as a range of low sand and gravel ridges, with great boulders intermixed. It is by means of this continuous dump-heap that the line of the front edge of the great ice sheet has been so clearly traced. As the ice sheet melted back into Canada, during many years (or perhaps centuries for all we can tell) while the climate of the world grew slowly warmer and better, it left behind upon the whole country that overcoat or surface deposit of clay, sand, gravel, and boulders, which it had gathered in its course and brought forward with it, but which of course it could not take back again; for while the ice was melting faster than it could move southward, it was still always moving southward, although its front edge was getting always further and further north. And although the ice sheet must have been between two or three thousand feet thick to enable it to flow so far south, it must have melted not only at its front edge, but everywhere over its whole surface; so that if the climate changed faster than climates have changed in our historical times, the disappearance of the ice may have been much more rapid than some suppose. We have no knowledge of the cause of the great change of climate in the ice age, any more than we know why the glaciers of the Alps in the eighth and ninth centuries were so much smaller than they are now; we can only imagine that the sun's heat varies from age to age, being sometimes greater, and sometimes less powerful: but in any case, we know that ice once covered the whole of Canada, the Lake region, New York State, New England, and northern New Jersey, and the north-eastern and north-western counties of Pennsylvania, and most of the north-western States, as most of Greenland is now covered with ice; and we know moreover that the ice sheet moved slowly southward bringing all sorts of rock-stuff with it; and that when it melted and disappeared it left everywhere an overcoat of this rock-stuff, say fifty feet deep, which we call the northern drift.

It is evident, then, that the farming soil of Pike, Monroe, Lackawanna, Luzerne, Wyoming, Sullivan, Wayne, Susquehanna, Bradford, Tioga, and Potter counties, and the farming soil of Erie, Crawford, Mercer, and Lawrence counties, and parts of Warren and Venango, must have been made out of the upper surface of this general overcoat of rock-trash—slates, limestones, sandstones, granites, &c.—brought from a distance and mixed up together; and that it must be in a general way one and the same kind of soil, containing the elements of all kinds of soils, practically similar to a mixture of all the soils formed out of the mother rocks of all other parts of the State. For although the stuff was brought from the north, yet the mother rocks in New York belong to the same formations as those which appear at the surface in middle and southern Pennsylvania; the rocks of Chester and Delaware counties, of the Reading and Easton highlands, and of the South mountain range west of the Susquehanna being the rocks of northern New York and the Canada mountains; and the rocks of middle Pennsylvania being the same as those of southern and central New York State.

The State as a whole, then, is to be divided, so far as its farm soils are concerned, into two areas: one, very large, the various soils of which lie directly upon the outcrops of the mother rocks and partake of their nature; and the other, much smaller, the common soil of which is separated from the mother rocks by an intermediate loose formation of foreign materials out of which it has been made. (See the accompanying map of the State.) This fact obliges us to go on to describe another and very important distinction.

The soils of the State where there is no drift, lying directly on the mother rocks, and formed gradually by the action of the air and the original forest vegetation, has not suffered much change, except that it has slipped somewhat down hill, as I described in my address published in the volume of the reports of the Board of Agriculture for 1878. But the soil of the drift-covered area has suffered a good deal of change in the course of time, and grown more sandy than it was at first. For the drift is very porous, and the rain-water sinks through it rather than runs off over its surface; so that the shape of the surface is not like the shape of the surface of other parts of the State, where every little stream cuts its own separate channel in the mother rock, and keeps carrying off rocks and sands and clays together. On the contrary, the drift country is lumpy and irregular, and has thousands of kettle-shaped hollows, in which lie swamps and ponds of water, some of them with little streams running into them and out of them; but many of them fed entirely by percolation through the surrounding walls of gravel; and some of them without any visible outlets, the water finding its way downwards and sideways between the bottom of the drift and the mother rock of the original surface. All of these swamps and ponds are lined with excessively fine mud, or marl, and beds of small shells, and beds of peat.

The cause of all this is easy enough to understand. The rain-water in passing down through the drift and percolating sideways to the low places, dissolves and carries away with it only the clay part of the drift, leaving the coarse sand and gravel and boulders behind; so that there is a sifting operation going on; the finer material being gradually carried down and out into the kettle holes to cement their bottoms and hold pond water; and the coarser materials being left in the mass of drift, which of course has been getting for hundreds or thousands of years more porous and sandy than it was at first. And as a good deal of the clay has found its way down stream into the rivers and so into the ocean, the drift overcoat is really not so thick or deep as it was once, and the whole surface of the drift covered country has settled down some feet or yards, we do not know how much; probably more in one place than in another; and as the big blocks in the drift could not be budged from their places by the heaviest rainstorms, but could have their softer envelopes washed from around them and from under them, they have been constantly making their appearance more and more above the surface, so that many of them now look as if they did not belong to the drift, but were dropped upon it afterwards; and indeed some geologists have been so deceived by this appearance as to imagine that the highlands have been covered by a rise of the ocean level, and that the big blocks which are thus perched upon the upper surface of the drift could not have got into their positions unless they had been floated from Canada on icebergs. But the fact is that just such big blocks are struck in the body and at the bottom of the drift by well-sinkers.

This gradual leaching operation, then, is the true cause of the greater sandiness of the present soil of the whole drift-covered country, and every farmer will appreciate the force of this fact in its bearing on the fertility of that portion of the State. It is very interesting to get this easy explanation also of why the innumerable swamps and ponds and sand ridges of Pennsylvania are all confined to the north-eastern, northern, and north-western counties of the State, bordering on the New Jersey, New York, and Ohio State lines. There is not a single lake and scarcely a swamp of any size to be seen on the State map south of the great line which marks the place where the front edge of the great ice sheet ran across our State.

Before leaving this subject, I wish to remark this sifting out of the softer and finer part of decomposed rock by rain-water is going out in all parts of the State, and especially on all hill slopes, the steeper the faster; and that it is the real cause of the sliding of soils down-hill; and it is also the cause of the tumbling of rocks down the mountain slopes, and in the gaps, whereever sand-rock layers lie upon clay slate layers; for where the slate rocks are softened and removed, the sand rocks overlying them are left unsupported and fall and slide into the valley. This is finely shown all through Western Pennsylvania, where large masses of the coal measure conglomerates are seen in their downward course from the hill tops to the river beds below. Where the valleys are deep and narrow there is no possible escape for the flat sand-rocks with clay under them; they must sooner or later come down. But on gentle farm slopes, the movement is arrested by any thick and heavy vegetation, which stops the rain-water and holds it and obliges the bulk of it to sink straight downward into the cracks of the mother rock, and so find its way by underground channels to issue in springs far down the slope or at the foot of the hill or in the water bed itself; while a part of it spreads sideways keeping the whole soil and subsoil moist.

The rain-water descends from the clouds, bringing down nothing but what wind-dust and sea salt it can wash out of the air. The wind-dust, however, represents all the minerals known to man, all the acids and alkalies, in rounded grains and minute crystals; and so every rain-fall adds a little—a very little, it is true—to the soil on which it falls, and what the soil does not retain is deposited in the cracks of the rocks, and what is not deposited is carried away into the sea.

But in sinking through the soil and through the rocks the rain-water takes up into solution much more solid matter than it washes out of the air, and, moreover, dissolves and carries off the chemical salts which it meets with in its way. It must be remembered that the rain-water finds its way down to great depths through rock cracks and rises again to the surface through other rock cracks; so that the rock formations for one or two thousand feet beneath the beds of the valleys are circulated through and through and in all directions by rain-water: so that chemists find in even the purest spring-water, which has gone but a short journey through sandstone, a little foreign matter, and in spring-water, which has gone far around and come up from great depths, a very considerable quantity of mineral salts. The further the water goes under ground before reaching the surface again the more of these chlorides, and silicates, and carbonates, and sulphates it holds in solution. Therefore, every spring of water which a farmer has in his fields is doing something toward charging the soil of his fields with chemical matters, and his crops must feel, more or less, the effect of it. Now, if his soil was nothing but the decomposed surface of the mother rock, its chemical character would be exactly that of the mother rock, mixed with whatever the roots, stalks, and leaves of dead vegetation afforded in addition. But, wherever spring-water moistens it, there the soil must have other materials brought through underground rock channels from greater or less distances. Thus, in western Pennsylvania, where the rock formations lie flat, and the limestones, and shales, and iron-ore beds, and coal beds lie piled upon one another to the tops of the hills, a man's field on the bottom slope of a hill will be *water-manured* by springs from which issues rain-water which, falling on the hill country above and sinking through a hundred different rock layers, brings with it the salts of alumina, lime, magnesia, soda, potash, iron, and manganese which it has dissolved out of them on its way.

It is not necessary to follow this train of thought into all its complicated ramifications. I only wish to point out the fact that the farmer's spring-water may be made by a system of irrigation to be of use in the way of mineral manure. Every one is familiar with the principle of irrigation, although so very little application is made of it in practical agriculture. Every one knows that if spring-water is led by a ditch across the top of a sloping farm field, and skillfully let out so as to keep the hill-side constantly wet, three or four heavy crops of grass can be cut from it every season. But I have never seen a calculation made of the amount of foreign mineral matter that could be added to the soil of a field in this way—matter, I mean, which is held in solution by the spring-water, and a part of which must be dropped in proportion as the water spread through the soil evaporates. Indeed the calculation would be a very difficult one; and it would be a still more difficult task to find out how much of the extra fertility of the field would be due to the water itself, and how much must be assigned to the mineral elements which it contained. But it is worth while to quote some facts concerning this last point. I will therefore select some of the chemical analyses of artesian well-water got from considerable depths in the brown sandstone formation of New Jersey (the same formation, which spreads across Bucks and Montgomery counties in our State) published in Prof. Cook's last very valuable and most interesting report of 1884.

The great "Boiling Spring" on the city line of Newark, N. J., flows at the rate of three hundred thousand gallons per day, fed by a water-bearing stratum underlying a thick bed of clay and muck which lies spread over the red sandstone rocks of a neighboring wooded valley one hundred and fifty acres in extent. Three six-inch artesian wells have been bored through this clay and deep into the red sandstone strata; one going through eight feet of clay and seventy-eight feet of rock; another through nine of clay and eighty-one of rock; and a third through eleven of clay and ninety-one of rock; and each flowing at the rate of two hundred and fifty thousand gallons per day. A fourth well was dug near the "Boiling Spring," twelve feet into the solid rock, twenty-five feet in diameter and roofed over, making a cistern, fed by the water which rises through the vertical cracks in the rock floor, at the rate of more than five hundred thousand gallons per day. A fifth cistern, fifty feet in diameter, sunk through eight feet of soil and clay, and six feet of rock, supplies seven hundred and fifty thousand gallons per day, and actually flowed at the rate of one million two hundred and fifty thousand gallons. The water flowed into the two cisterns at a different rate at first; for the first foot of the smaller cistern (3,682 gallons) filled in seven minutes; whereas the first foot of the larger (14,728 gallons) filled in only eighteen minutes, instead of in twenty-eight, but afterwards at the same rate, for the fifth foot in the smaller filled in fourteen minutes, and the fifth foot in the larger filled in fifty-five minutes, instead of fifty-six. The water came in slower and slower; so that the fifteenth foot of the smaller cistern required one hundred and fifteen minutes to fill; which shows that the body of water does not come upwards from a very great depth in the sandrocks, but sideways from the surrounding country, through the upper parts of the rock floor beneath the clay. Yet it is equally clear from the larger yield of the three artesian wells, Nos. 1, 2, 3, that all the fissures of the red sandstone formation of the country are filled with freely flowing waters to a considerable depth, certainly more than a hundred feet.

This is established beyond doubt by another artesian well in the city of Newark, which was bored in 1879, through one hundred and ten feet of earth and five hundred and five of the red sandstone rocks, and is yielding eight hundred thousand gallons per day. The water of this well must travel through many miles of the red sandstone formation, at depths of at least five hundred feet; for it is not likely that the neighboring rivers can be the *immediate* source of its supply, seeing that they flow over the covering formation of clay; and for another reason, namely, the great difference of the chemical character between the water of this deep city well, and the water of the shallow wells on the city line before mentioned; for, if the rivers were the source of the one, they would be the source of the other; and the chemical composition of both should be the same. The great difference in chemical constitution must be due, then, to the fact that the water of the deep artesian well in the city travels slowly through a great body of the red sandstone rock; and it is to this fact that I wish to draw attention; and I have gone into the neighboring State of New Jersey for a better example of how rain-water gets changed in its nature by its descent into rock formations before it rises to the springs in the farmer's fields, than I could find in our own State.

I will now give Prof. Cook's reported analyses of the two kinds of well-water at Newark:

In the first place, the water of the shallow wells holds only from ten to thirteen grains of solid matter in a gallon, whereas the water of the deep well holds one hundred and fifty grains, and varies so little in this that the first analysis in 1879 gave 152.81; the second, six weeks later, 145, and the third, in 1882, 151.79 grains.

Of the whole amount of solid matter in the deep well water, more than two thirds (106.98 grains) is *sulphate of lime*, (*gypsum*,) one sixth (25.87) is *sulphate of magnesia*, and one tenth (15.94) is *sulphate of soda;* whereas, the *lime* in the water of the shallow wells amounts to only between two and four grains; the *magnesia* between 0.3 and 0.7, and the *soda* (in well No. 3) to two grains. Even these small quantities are not all in the shape of *sulphates*, for "sulphuric acid, as sulphates," appears in well No 1 as 0.37; in No. 2 as 0.3, and in No. 3 as 0.38.

Another curious difference appears in the fact that the deep well water holds 2.5 grains of *common salt* (chloride of sodium) to the gallon, whereas the shallow well water, No. 3, alone shows *soda*, (1.9 grains,) with *chlorine*, (0.9;) No. 1 showing only chlorine 2.2, and No. 2, chlorine 1.2, apparently in combination with lime; for *the estimated* amounts of *carbonate of lime* in all three is about five grains to the gallon; not enough to give the water any hardness, and proving that it does not come in contact with limestone strata on its way through the rocks.

The absence of *potash* from both the shallow and deep well water is noteworthy; it only appears in the analysis of well No. 3 as a fifth of a grain to a gallon of water.

On the other hand, the shallow well waters all show *silica*, of course in small quantities, (0.9, 0.6, and 1.2;) but the analysis of the deep well water shows no silica, whereas we should expect a notable quantity, got from so long a journey through sandstone strata. But the red sandstone formation is really a red shale formation, made from muddy deposits rather than from sand deposits, and the muds are satisfied salts of silica.

Now, let us take merely the gypsum of the deep well water of Newark and make a calculation of the quantity of it which such a source of water would deposit in a year or a century, and see if such a calculation can be of any benefit to us in estimating the effect of spring or rock water on soils. The deep well flows eight hundred thousand gallons per day, holding, say 800,000 × 100 = 80,000,000 grains, or about seven tons of gypsum. This would make about twenty-five hundred tons a year, enough to cover an eighty-acre farm with a layer of gypsum only one thousandth of an inch deep; yet it would be as much as if the farmer had spread that year thirty-five bushels of gypsum to the acre.

Such a calculation, however, does us very little good; for we should have to suppose that the farmer not only had the exclusive right to this magnificent water-supply, but that he could confine its outflow to his eighty-acre farm and evaporate the whole of it inside his fences. Such an idea is absurd. But suppose the farmer has on his farm a spring of the same quality, but a thousand times less in force, say eight hundred gallons a day, and could confine its water-flow to his eighty acres, the same effect would be produced, only, in that case, it would require a thousand years instead of one year. And if his spring only flowed eighty gallons a day, instead of eight hundred thousand, the same effect would be produced in ten thousand years.

All that I wish to draw attention to is the practical fact, which is of some importance to farmers—although not so much as an enthusiastic geologist might at first thought imagine—viz: that this is what all the springs of our country are actually doing, and keep on doing all the time, and have been doing for centuries and thousands of years, each one according to its little ability and the circumstances of its situation; so that while it is strictly true that the character of a soil has been settled for it originally by the character of the geological formation, the mother rock, the concealed outcrop, on which it lies and out of the decomposed surface of which it has been formed—nevertheless that original character of the soil has in the long lapse of ages been somewhat, not much, but still somewhat, changed by chemical substances brought into it by spring waters from a distance.

But now I wish to point out a more important modification of the original soils by a very different agency, namely, the winds; for, as every rainstorm washes down into the soil whatever rock-dust happens to be floating about in the upper air, so, every dry-storm takes up quite considerable quantities of rock-dust from exposed outcrops, roads, quarries, dried ponds, river banks, and especially the sea-shore and spreads it over the cultivated fields, where it is entangled in the vegetation, and the next rain incorporates it with the soil.

It is impossible to make anything like a fair estimate of the amount of mineral matter which is thus added every year to the soil of the country; but it is easy to show that this operation of nature is of importance to agriculture; equalizing our soils, by distributing fertile mineral elements everywhere without any regard to the geological formations; transferring limestone dust from the belts of limestone rock, to sandstone and claystone districts; and in return spreading invisible sheets of fine sand and powdered clay over limestone fields.

One example will be enough to prove and illustrate this beautiful operation of nature, which has been going on through all time; least powerfully in countries unsettled, and, therefore, still covered with a protecting covering of prairie grass and forest having moist climates; more and more powerfully, in proportion as population increases, the forest is cleared away, the flat lands are turned up with the plow and the rainfall becomes a series of heavy showers. It is needless to recite the exceptional cases of volcanic dust deposit, and the local cases of bad lands, desert borders, seashore dunes, the cutting sand streams passing all the time over the crest of the Sierra Nevada, etc.; for, while such things illustrate the general principle, they do not directly affect the soils of any part of Pennsylvania. I will, therefore, select a case where the effect produced is perfectly clear and simple and such as may occur anywhere, and at the same time has been studied carefully and proved in a satisfactory manner.

The chalk formation of England is one of the best known and simplest in the world. Any soil formed by the decomposition of its surface ought to be almost a pure carbonate of lime, mixed with vegetable matter. If a chemist should find in it any other mineral matters in considerable quantities he could explain their presence by the mouldering away of the chalk mass and the concentration upon its surface of the minute percentage of such matters which are distributed through it. But the soil of the chalk downs has been examined with a microscope, and a large quantity of *quartz sand* has been found in it. This quartz sand must have come in the winds from a distance; for the silica in chalk is not in the form of quartz crystal, but in the form of flin

A good deal of coarse sand, says Mr. Clement Reid, to whom we owe a discussion of the subject, is blown up from the seashore by the equinoctial western gales; but not very far. The same wind however that moves the coarser sand disperses the finer dust in clouds over hill and dale. The soil on chalk downs is very thin, and it is not an uncommon occurrence for the winds to clean it entirely off, together with the seed that has been sown in it. That dust blows most in hot summer weather is doubtful; the dry winter winds probably carry much more of it. Mr. Reid noticed one winter day that the east wind was sweeping from the surface of the moors in north Yorkshire clouds of dust composed of minute fragments of the shale rock, cracked into powder by the frost, tufts of heather being thus undermined and uprooted. He expresses the belief that England owes much of her fertility to the keen east winds of spring, manuring with rock-dust the surface of the island. Mr. Darwin's book on soils, says that "in counties where the summer is long and dry the mould in protected places must be largely increased by dust blown from other and more exposed places."

In my address in 1878 I laid most stress on the fact that the subsoil is made out of the rock, and the soil out of the subsoil. Now, as the winds cannot reach the subsoil, it is quite reasonable for geologists to insist that a chemical analysis of the mother rock will explain the chemical composition of the *subsoil*. But agriculturists have gone a step further, and I think a little too far, in urging that a chemical analysis of the subsoil will explain the chemical composition of the *soil*. It would do so if there were no wind-dust to interfere. But most soils are found to differ from their subsoils chemically a good deal more than they ought to do if only vegetation be taken into the account; and as a geologist I have been led to believe that the cause of the difference may be found in the action of the winds, part of whose business seems to be to mix the soils of different districts together.

THE WORK OF THE NEW YORK EXPERIMENT STATION.

By DR. E. L. STURTEVANT, *Director*.

MR. PRESIDENT, LADIES, AND GENTLEMEN:

It is sometimes well to look to the past to see if we can get lessons which will apply to the present, for oftentimes in this manner facts may be obtained which are decisive in their character. In the early days of the present era, we had authors who gave us very good literature concerning Roman agriculture during a period of several hundred years. Cato, Varro, Columella, Palladius, and Vegedius' writings show that the Roman farmer was painstaking to the most careful degree, and that the cheapness of slaves and the demand for produce brought about a farming which resembled more our garden than our field practice. The land was thoroughly tilled, the various operations of husbandry were performed in a very perfect manner, and the crops were attended to in the best way. The manure made on the farm was carefully replaced on the land, and yet the universal testimony is that there was a progressive diminution in crops, and that the population were dependent largely upon imports from other countries. Yet this continued even under conditions for the most successful culture—cheap labor and advancing prices. We have here an experiment carried over several hundred years, by which it seems evident that by mere cultivation alone the manure of the farm cannot maintain fertility so long as sales are made from the farm. In contrast, we will glance at the agriculture of England since about 1840, the time when artificial fertilizers began to receive attention. We note from this period great improvement in English agriculture, a greater freedom of sale from the farm, and a progressive increase in crops and cropping capacity of the land, affording a marked contrast to what we have mentioned as having occurred in Italy. These two experiments, in Italy and England, seem to prove the fact that when we take long eras into consideration when the crops are sold from the farm, although for a short time we may get good crops, yet exhaustion is going on which ultimately will bring diminution of crops, unless science steps in and supplies a way out of the difficulty. It is from the hope that progressive exhaustion of the soil may be prevented, and the belief that more profitable farming can be pursued, where new knowledge has been acquired, that the existence of experiment stations becomes justified. This leads me to the subject I am to talk on, which may be called methods of agricultural experimenting, and which I shall purposely make a little rambling, as my intent is to be illustrative rather than convincing.

The work of an experiment station is two-fold. One portion is experimental, the other verificative. An experiment proper may have no immediate relation to practice. It may be merely for the purpose of ascertaining facts which may tend to illustrate, or to make possible, the interpretation or the results of practice; and yet the ultimate object of experiment is that the information thus derived may be so applied as to increase the crops of the farm or to diminish the cost of production. An experiment station is founded for the purpose of discovering the laws which govern upon the farm, their character, to what extent they are under human control, and how mankind can influence them in the direction for their own advantage.

My first illustration may seem to you trivial, and I select it because of its apparent triviality, in order to show to you how important apparently small matters may become when studied in their practical relations. I have here two fields of corn, which have been planted at the same time and in the same manner, with the same kind of seed, proved to be good, but with seed from two different sources. In one field, we have good germination and a fair plant; in the other field, the corn does not germinate, and replanting is required. Now, what was the cause of the growth of the corn-seed in one field and its failure in the other? Most people say it was the cold of the spring that prevented germination. The experiment, then, which is required is to determine whether cold did prevent germination; for, if cold is the cause, the only way to prevent it is by a later planting. If cold is not the cause, then it is possible that the cause, when discovered, may be under our control The first reflection is that if cold killed the corn in one field, why did it not kill the corn in the other? This one fact would lead to the belief that it is not the cold which causes the poor germination. However, to make the matter sure, a germination apparatus was prepared, in which a low temperature could be constantly maintained for long periods. It was found in these trials that corn exposed to a temperature of from thirty-seven to forty-one degrees did not rot, but germinated after a long interval, and when removed from the apparatus and exposed to a temperature of from seventy to seventy-five degrees, growth was rapid, healthy, and vigorous. We can, therefore, assert with certainty that the cause of the non-germination in the early planting was not the cold, but must be sought for in some other circumstance. Upon looking over our record, it was found that the corn which germinated poorly was taken from the bin, and the corn which showed good germination was taken from a room in which it had become thoroughly dried. This suggested the experiment whether drying had anything to do with the vitality of corn. It was found that the dry corn germinated perfectly, while the corn from the bin germinated less perfectly We have, therefore, the practical conclusion that kiln-drying seed-corn will prevent the loss of the plant in early planting to a large extent. By carefully noting the conditions during growth, we find that blue mold (a fungus) will grow at a lower temperature than will corn, and that when corn germinates rapidly it grows in advance of the development of the mold, but that when germinating slowly mold will develop so rapidly as to destroy the kernel before it has a chance to secure a foothold. Thus, it becomes evident that the loss of seed comes not from the cold soil, but from the delay in germination, which allowed the mold time to destroy the seed. We are now brought to the conclusion that not the cold, but the mold, destroyed the corn, and this suggests another experiment. By selecting corn-seed from cobs on which there was no appearance of mold, and from cobs which showed a few black, moldy spots, and germinating this seed, we secured, in the one case, complete germination, while in the other case we were greatly troubled by the mold, which killed a large portion of the seed. We are now ready to draw our conclusions. We find that the cause of the poor seeding was not the cold, but was the character of the seed; that mold destroyed the corn, and that mold can be recognized in advance upon the cob. The practical conclusion, therefore, is, that if we select corn which is free from the appearance of mold, and that if this corn be kiln-dried, germination will result under the most unfavorable conditions which are likely to occur in practice. We have separated the causes of failure, and find that they are under human control. Plats are now planted to verify these conclusions. We thus see that this apparently trivial experiment furnished data which may secure us against the results of failure in our planting, and is capable of obviating one of the most common causes, in many regions, of deficiency in crop. Any of you who will look over the crop predictions of the season will see the immensity of the loss which comes from the failure of seed to germinate. This very fact indicates clearly the value of a little experiment of the kind, which will enable the thoughtful farmer to escape this source of loss.

The next point I wish to consider has reference to butter-making. Why is it that the same person cannot always make the same quality of butter? Why is it that sometimes, under the most ordinary care, first-class butter can be made, while at other times the most careful attempts will result in butter of poorer quality? The conditions of butter-making being alike, and the quality being different, suggest that the reason must be sought for in the individuality of the cow. For the purpose of testing the validity of this suggestion, by means of a cherry test churn we have churned, under exact and like conditions, the milk of the various cows in the station herd. Some seven hundred or more churnings have been made the past season of milk previously analyzed and drawn from cows whose feed and conditions have been systematically noted. We find that some cows furnish a milk which always makes a high quality of butter. We find that one of our cows furnishes a milk which, although it contains the necessary amount of fat, and is apparently of excellent quality, yet never furnishes butter of good quality. We have here outlined a fact of great interest to dairymen. We find that the quality of butter and the ease of butter-making depend largely upon the individuality of the animal. I think that I may safely say there would be more profit from the five cows of the station herd than from the six. In other words, the eliminating from our dairy the milk of the sixth cow would add to the value of the butter and to the profit derived from the churnings. Just think of it a moment—five cows better than six, and the discarding of the sixth means the saving of the first cost of one cow, and the annual cost of her food and care! How many farmers know the value of their individual cows for the purpose for which they are used? It seems very probable that the farmer who would keep a record of the amount of cream or butter that he secured from the milk of each individual cow would find it greatly to his advantage to dispose of certain cows in his herd, and would soon find out, by so doing, that with fewer cows he would absolutely add to his profits. The farmer, however, is a type of the business man who does not desire, as a rule, to understand his own business. The merchant does not hesitate to follow that course which will add to his profits. The farmer usually thinks it is too troublesome to weigh each cow's milk daily, or to churn now and then the milk of each cow separately, and in consequence knowing which cow brings him a profit and which brings him a loss. When a man learns through his own experience that cows have an individuality, he has made a great stride towards success. To illustrate this individuality of the cow, I will report to you the results observed during an experiment with two cows continued over one hundred and sixty days, wherein the cow which weighed two hundred pounds more than the other consumed no more feed than did the lighter cow, and this apparently from the power this cow had to digest her food more thoroughly than did the other. We also found that one cow had the power of diverting her food more toward milk product than did the other. We note also that the cows varied in their appetite for food and drink from day to day, and that when fed *ad libitum*, different kinds of food were consumed daily and different amounts of water drank. The differences were often quite well marked, as for instance, while in perfect health, twenty-six pounds of water one day and one hundred and five pounds of water the next. The amount of water drank one day influences the apparent live weight of the next day, so that a variation in live weight may have no real connection with gain or loss in flesh. Thus, on February 8, a cow weighed seven hundred and three pounds; on February 15, seven hundred and forty-five pounds, an apparent gain of forty-two pounds for the week; and yet if we take the weights of February 7, seven hundred and fifty-one pounds, and February 14, seven hundred and forty-five pounds, we have an apparent loss of six pounds. This illustration indicates the necessity of daily weighings, if we would know the gain or loss, rather than at the commencement and at the end of the experiment, as a single weighing is influenced so much by the amount of water consumed the previous day.

Another point, the third and last one, is in regard to fertilizers—whether one fertilizer is better than another—whether a farmer can afford to use fertilizers on his crops—whether a farmer will increase his crops in one season—are local questions which can only be answered at an experiment station for its own land, and the results will not apply to any one else's land or any other locality, because the whole thing is influenced by the local conditions of the place. The action of fertilizer is influenced by the character of the plant, the temperature and moisture of the soil, and the method used. If plants are studied in their underground relations, it will be seen that the various kinds have various habits of rooting. Some may be classed as shallow rooters, and others as deep rooters. If fertilizer is put in below the roots, the roots do not reach it, and, therefore, we cannot expect any resultant crop. If fertilizer is placed upon the surface, and the plant is deep rooting, but a small portion of the fertilizer reaches the plant. In a warm season the corn-plant feeds vigorously. In a cool season it feeds sluggishly. Consequently, it would follow that fertilizer would benefit the corn-plant most during a warm season. The potato is a deep-rooting plant, and succeeds best at a soil temperature far lower than that required for corn. We find that during a year in which corn re-acts most favorably to fertilizer, the potato acts less favorably and *vice versa*. Experimental trials with fertilizer must be governed by such considerations as these, and we must judge efficacy under conditions which can be carefully noted. For this purpose it is required to use it on different kinds of plants, and during seasons in which we have a record of soil temperatures, for otherwise we should find it very difficult to trace cause and effect. We frequently find a greater variation between plants treated alike than between plants which have received different quantities of a given fertilizer; in every case, the result obtained is a local one, and gives but little information for general practice. The line of experiment, therefore, in this direction is to determine under what conditions the fertilizing material can become incorporated into plant structure, for it is self-evident that all the fertilizer which enters into the plant means so much increase of production. The method of experimenting with fertilizer is to determine the correlations which occur with the plant. The following is the details of an experiment: A trench is dug alongside a single hill of corn a little deeper, and a little longer than the roots extend. By means of a hose and a spray of water, the earth is carefully washed away from the roots into the trench, so as to expose the fibers as they lay in the soil. We find that in our region the principal feeding roots occupy the upper four inches of the soil, and extend a distance of some twelve feet from the plant. If we examine these roots carefully, we find that some few extend downward a distance of three feet, more or less. The proportion of these deep-extending roots to the lateral roots is about one to one thousand, or more. Hence we reason that corn will respond more successfully to broadcast fertilization and to surface manuring than to hill fertilization or deep manuring. We, therefore, have a guide to practice applicable to regions where a mean temperature of eighty-two degrees is maintained in the upper four inches of the soil during the growing season. The same operation applied to the potato plant shows that our better varieties occupy, with their roots, a circle about eighteen inches in diameter, the roots extending below the tubers, and ramifying at a depth within the soil. It, therefore, seems reasonable to believe that manure placed below the seed would be more beneficial to the plant than if placed above, and trial seems to justify the belief. I will here call your attention to variety differences in potatoes. The potatoes of my boyhood days were usually borne further from the plant than are the more improved varieties of to-day. The wild potatoes from Arizona, as grown in the station ground, bears its tubers many feet from the plant. A wood-cut that I have of the potato in 1671 shows a plant whose tubers extend a long distance from the stem. Our modern varieties, such as the White Star, bear their tubers in a bunch close to the plant. It thus seems that the rules for manuring which applied to the potato of 1671 would not necessarily apply to the potato of 1885. Those of my audience who grow potatoes whose habit of growth carries the potato far from the plant may find a different process of manuring advantageous than that outlined here from information founded upon the more improved varieties.

Experimentation, to be successful, requires a training as well as an expense which is beyond the limits of the ordinary farmer. In experimenting, we have to keep a record of conditions which, at first thought, may seem to the observer to have little connection with the results that we wish to attain. We have to employ skilled men to make notes of the condition of the soil, temperature, and of the different stages of growth of the plant. We have to consume much time in bringing these notes into harmony and studying the various relations which occur. We must note the number of plants in each row, the number of seeds which are planted, the number which grew, the amount of crop, etc., etc. For the complete study of even such simple matters as these, I have noticed that we require the services of a chemist, botanist, and of mathematicians. These various trials must be carried on with such carefulness that we may be absolutely sure of the premises upon which all our reasonings are to be founded. We have to be theoretical as well as practical, but the conclusion is certain, that when the theory is correct, theory and practice always coincide. This adds to the importance of the various considerations which the practical man is often unwilling to acknowledge.

I am now ready to answer any question which may be put to me.

J. McDowell of Washington county. I was glad the gentleman referred to the temperature of the soil. One part of my soil is limestone, and another portion of it is a sandy soil, and we always find that the corn in the limestone ground is up a few days before the other, and makes growth much more rapid than that on the sandy soil. With regard to the product—how to obtain the best results—I would like to ask whether they ever make it a practice to pull out all the poor stalks in order to breed the very best corn. It has always occurred to me that we can improve our corn very largely by not planting it too closely, and when it is up by going through the corn and tearing out all those stalks which are poor. We find that one of the great drawbacks in the crops of our sandy soil is the little ant. We have had to plant our corn over; we have planted our corn and found that this little pest injured it so much that we had to plant it again—some are complaining of it now, and replanting their corn. I would like to hear a remedy suggested to get rid of this little pest.

Dr. Sturtevant. Of course the gentleman expects me to speak favorably of breeding seed corn, as I was perhaps the very first one to undertake the breeding of seed-corn, but in this whole question of corn-planting I would say that I do not know yet how to grow corn, for I cannot get as good results at Geneva, New York, as I have been in the habit of obtaining in Massachusetts. I was talking with Mr. Newman, of Alabama, and I found he differed with me in the growing of corn. He says you must plant one stalk in a hill five feet apart in Alabama. My own practice in Massachusetts was to put four kernels in a hill, the hills being about two feet apart, and in drills three and one half feet apart. This variability of practice appears to be connected with the rainfall of the locality, but I do not want, as yet, to be very positive on this matter. I reason in this way: In Massachusetts my average crop of corn was seventy-nine bushels per acre, my maximum crop one hundred and twenty-three. In New York I cannot get a maximum of much over seventy bushels. In Alabama, where single plants five feet apart form the practice, evaporation is great during the growing season. The average rainfall at Geneva is about thirty inches for the year, and at my place in Massachusetts it was about forty-five inches. The amount of water required to carry a corn-plant through growth is something enormous, I forget the exact figures. In planting corn closely, say one foot apart—I find very feeble growth, and every indication of lack of water. From reasoning founded upon data such as this, I have come to the conclusion that thickness of planting corn is determined very largely, if not entirely, by the amount of evaporation, and the amount of rainfall of the locality during the growing season.

E. Harvey of Delaware. I would like to ask the gentleman whether he has discovered any remedy for cut worms.

Dr. Sturtevant. No, sir. I once thought I had mastered the insect but I applied the same remedy again and failed, so that at present I must say that I have none to suggest. Some years I could report that certain things will drive insects away. One year I had corn cobs dipped in coal tar, and put among the squash plants. This was nearly a complete protection. The next year I found the coal tar of little protection, as the insects came in overpowering numbers, and, being hungry, would eat from the unpalatable hills as well as from the palatable ones. I am willing to believe that the only remedy against worms is to kill them, but how to certainly kill them in every case is a subject for further consideration. My experience invariably has been that early-planted corn gave better results than later-planted corn. I was once using a western corn-planter, on a nine-acre field, which planted two rows at one time, but, through some mischance that year, every alternate two rows were left unplanted. After about two weeks, I discovered that my field was planted with two rows intervals, and I then went over it a second time and planted the vacant rows. Being interested in the results, I harvested the early and late plantings separately, and weighed the corn. In no one case did the late planting equal in weight the early planting. Since coming to the station, I have noted some reasons which may explain this observation. In the green-house if you wish to root plants you desire a warm soil and a cool atmosphere. In the field in spring we have this condition; the soil warmer than the air, and therefore reason that the early-planted corn established a better root growth than did the later-planted corn, on account of the greater difference between the warmth of the soil and the air during the two periods of early growth.

Col. YOUNG of Dauphin. Don't you think that it is very necessary to have the ground prepared and in good condition, plowed deep, and well pulverized?

Dr. STURTEVANT. In planting corn, I have noticed great benefit to be derived from thoroughly pressing the earth to the seed. In planting some plats I gave orders that the man planting should stand upon each hill while he planted the next one. I went down and looked on while he was planting, to see whether this was being done, and saw that it was neglected on one plat. I left this plat to be finished without interruption, and noted the result of the stand was very much in favor of the plats which were trampled as directed. I am not in favor of hand corn-planters, because they do not compress the soil over the seed, and I think it would pay any farmer who cares for ten acres of corn to own one of these western corn-planters, which plants two rows at a time, and whose wheel runs over the seed as planted. Corn land requires much harrowing. The object of harrowing is to concentrate the soil. There is no tool which takes the place of a harrow. You go into a green-house and pot a plant loosely, and you will notice failure in nearly every instance, but where the soil is pressed with the thumbs about the plant, you will find nearly universal success. You go into a muck swamp in the East, and you will note that where a cart track runs over it herds grass will grow where the soil is pressed by the wheels, while in other places only swamp grasses occur. Many other illustrations might be given of the importance of concentrating the soil. Fill a half-bushel measure with oats, and strike it level. Now, stir these oats carefully, and you will find that you can condense them, so that more can be poured into the measure. In the same way, a harrow concentrates the soil, so that, while it is left permeable, it occupies less space than before the harrowing, and is in better condition for supporting the growth of the young corn.

M. W. OLIVER of Crawford county. I would like to ask Mr. Sturtevant when he would recommend manuring, and how to plant.

Dr. STURTEVANT. My answer would be to spread the manure or fertilizer upon the surface and harrow it in, as the corn plant is a shallow feeder, and the feed for growth is obtained from the upper layers of the soil. As to planting corn, it has been our experience that it should be put in as shallow as possible, without liability of being washed out by the spring rains. With us, about one inch deep seems, under ordinary circumstances, the best depth. The depth of planting, however, varies with the locality. In the South-west, it is planted eighteen inches deep, a hole being punched in the ground, and the corn kernel buried in a ball of clay placed at the bottom in order that the germinating seed may be in contact with the moisture of the lower soil. With us, we find that some of the seed will come up even when planted eight inches deep, but that a larger proportion vegetated at one inch deep than at any other depth.

J. G. ZERR of Berks. I would like to further illustrate in regard to what the Doctor said in reference to salt. I have a neighbor who could not grow corn successfully. He was told that if he would use salt he would be successful in the raising of corn, and he applied to the man who keeps store in our place to get him a ton of salt—get him anything that he could in the shape of salt, whether it was the scrapings of the salt house, or anything of that kind; and he did so, and sowed it on his plowed corn ground, and that year he was successful in his crop, and he has been raising corn successfully every year. This year he neglected to get his salt, and he put out his corn in one of his fields, and the wire-worm has eaten his corn up so badly that he said he would get no crop at all. He told me this a few days ago.

Col. V. E. PIOLLET of Bradford. I have purchased sixty tons of salt in the last four years. I took three bushels of salt and two bushels of slacked lime—I have a plaster sower that goes along and sows three rows at a time. No fly touched a turnip leaf where that composition went, and the Doctor tells me they are eating his up, so I will pay him back for what he is doing here. If you will just sprinkle that with the plaster sower—that is the only service that I have had of this mixture. So far as the pulverizing of the soil is concerned, no plant ever matured over a cavity, so that the whole thing of pulverizing the soil is to pack it down so that there is no cavity. Then the roller ought to follow the plow; then the harrow go on, and the more times you go over it with these horse feet you will have a better cultivated surface.

Col. YOUNG. After all, don't you find that the best thing is the barn-yard manure?

Col. PIOLLET. Yes, sir. I took my friend around a corn-field to-day, and he said, "Why, that corn is as big as mine," and he lives two hundred miles south of me, where the temperature is different, and the conditions of the weather are different. I believe the barn-yard manure ought to be applied as fast as it is made. I covered that field last winter when there was snow on the ground, and I hauled it out there just as fast as it was made—when we could get on there with horse and wagon.

H. M. ENGLE of Lancaster. This question has become an interesting one, and we have received very interesting information from the Professor in reference to corn ground being prepared to germinate well. There is no question in my mind so important, and my opinion is that the general failure of corn coming up is because not enough care is taken in the selecting of corn from the crib. The best corn should be taken from the crib when selecting it for planting. I am in favor of shallow planting, especially early in the season. There is no question: corn or any other grain, the shallower we can plant it, so it is not too shallow, the quicker it will come up—that is an important matter. In the matter of salt, I have always been a little doubtful of applying too much salt to any grain you plant. I have tried it on melon seed, and it never germinated, and I would be afraid to apply it in too great a quantity to corn or any other seed, for fear it would not germinate. With reference to planting late corn, I think that is not a fair test. He planted alternate rows, and planted the second later; the trouble is that the earlier gets the start and absorbs the fertilizing ingredients; but plant that same corn at the same time, and it will do just as well. I venture to say that if the Doctor would have had it all to hit at the first planting, it would have been generally alike; or if he had planted half the field altogether and missed the other half, the difference would not have been so much, because the earlier planting had the advantage and kept the later back. That is my experience in planting the cabbage plant; you plant two large, strong plants and a small one, or two small ones and a large one, and the smaller ones will remain behind all the time, because the large one has the advantage; but when we plant, we assort our plants and plant the smaller ones in one place and the larger in another, and the smaller ones do just as well as the larger ones. In regard to the planting of corn close or distant: there is no rule to be laid down in that case; there is such a difference in corn—there are some varieties grow large stocks, and the larger the stalk, the larger the variety, and the wider we are required to plant it; it wants room to grow. The smaller the variety, the closer we can plant it. What farmers ought to all aim at is not to raise the largest stalks of corn but to grow the largest proportion of ears. I have been experimenting some also, although not as much as the Doctor. I have known neighbors to grow larger stalks than myself, but the ears were not larger. You can grow corn with a large proportion of corn to the cob. There is some corn growing that the cob is nearly as thick as the corn. You take a paper and wrap it around the cob, and you can fill that paper with the corn. In growing corn there is another point, and that is to get a proper shape of the ear; we find corn, sometimes planted that is very heavy across the butt of the ear and the ear is short—there is a wide field open for improvement.

Dr. STURTEVANT. In speaking of growing corn, we must remember that a great deal depends upon the variety grown. This present year I am growing a variety called the Top-over, which is so very distinct, and so very peculiar that it may interest you to have a description. In the first place the ear is fusiform. The butt and tip resemble each other so closely that when the stalk is removed, the butt cannot be distinguished from the tip by casual inspection. This comes also from the smallness of the ear stalk, which is only the size of a pipe stem. The seed is very dense, and is very compact upon the cob, which is about eight inches in length. It is a novelty that we are now growing for distribution, provided it answers expectations.

The ear is eight to eight and one half inches long and it is made up by the extraordinary compact grains; it weighs, as near as I can tell you, about sixty-four pounds to the bushel, and when it is shelled, it is surprising what an amount of grains is taken off. They call it the Top-over, this year because, when it ripens, it drops over.

Dr. E. HARVEY. What would be early in one locality would not be so in another. There is much to be said in favor of late planting and early planting; late planting gives two or three weeks of pasture before planting; they usually plant about the 10th of May, in my section, and I live in the southern part of the State. The corn comes up in the warm weather as promptly as the grass, but if you plant early with us and the grain comes up, the ground keeps as hard as a brick and you will have a difficult time to get it worked; but if it is planted late, your corn comes up as good as the grass—it comes up strong and healthy, and if it is planted early it comes up yellow and sickly. It seems to me that this corn, which is not a native of this part of the world, does not grow well without hot weather. I can see no reason why you would spread the manure on the snow. I am extremely interested in the results of Prof. Sturtevant; they are the kind that come from undoubted scientific observations, carefully made, and deductions not rationally drawn, but careful and rational.

Mr. **Palmer.** I arise to ask Dr. Sturtevant a question: Whether his manure that he drew out was plowed under? If his crop is what he says it is—and I have no doubt it is as he said it was,—how the Professor accounts for that; he recommends that we put manure on the soil and drag it in, notwithstanding Col. Piolett stated that he would put it on the snow and plwh it under.

Dr. **Sturtevant.** I would say the hauling of manure out in winter and spring received much discussion at a meeting of the Connecticut Board of Agriculture some years since, and I doubt if there is any steeper hillsides in Pennsylvania than can be found in the New England States. In Maine, I have seen manure put on top of the snow upon a steep hillside, and the following year we could not trace the effects of the wash more than a few rods. There is something very curious about the action of manure. In the first place, the elements which influence the crop are soluble. The black liquid which comes from a manure heap may have its soluble ingredients removed, leaving the color, by its passage over the ground. Barnyard manure has two actions upon the crop, the one chemical, and the other physical. Raw manure can be used most successfully upon corn, but when applied to some other crops, it breaks the capillary connections of the soil, and causes dryness, which is detrimental. If a layer of manure be placed, in summer, a few inches under the surface of the soil, and a drought occurs, the plants which have not become established and whose roots do not extend below this manure may perish, while if this manure was thoroughly incorporated with the soil, the results would be only beneficial.

DAIRY FARMING IN NORTHERN PENNSYLVANIA.

By J. W. Ingham, *of Sugar Run, Pennsylvania.*

(Read at the summer meeting.)

From my subject, "Dairy Farming in Northern Pennsylvania," it might be inferred that I intended to give a history of the rise, the progress, and the present condition of that interest in the region mentioned; but it is rather my purpose to show that dairying is more profitable than grain-raising, is more favorable for maintaining the fertility of the soil, and ought to engage the chief attention of our agriculturists.

The hills and valleys of northern Pennsylvania, though fertile, beautiful, and healthy, though they are capable of producing most of the grains, grasses, and fruits of the temperate zone, and although they are as the garden of Eden when compared to most of the land in the New England States, yet they do not begin to equal the great plains and prairies of the West in the depth and natural richness of soil and freedom from obstructions to rapid and cheap cultivation. Some farms in the West have withstood continuous grain-cropping for twenty years without any rest or fertilization, and do not show much signs of exhaustion. Our lands will not stand such abuse, and should not be subject to it if they could.

By dairy-farming, I do not mean the production of milk, butter, and cheese, to the entire exclusion of grain-raising or stock-rearing, as the Southern planters used to raise cotton to the exclusion of most other farm crops, and were obliged to purchase their flour, meat, and butter from the North and the West; but I mean that dairying should be the chief object we have in view, and grain-raising a secondary consideration and a contributor to the chief object.

When the completion of the Erie railroad opened the milk market of New York city to the farmers of Orange county, and they found the production of milk was so much more profitable than grain-raising had ever been, the cry went forth—"*burn up the plows.*" In a few years, however, they discovered that their meadows and pastures, which had been well seeded and productive, were beginning to fail. The most luxuriant and nutritious grasses were running out, and their places were being occupied by coarser grasses and noxious weeds; then the plows which fortunately they had not burned, were brought out, the fields, as they could spare them, were plowed, the large piles of manure which had accumulated were drawn out and spread on them, and a very heavy crop of corn was raised first, then a good crop of wheat, when they were reseeded and retained in grass so long as they produced well. In the moist climate of Great Britain, it is said that some meadows have not been plowed for a thousand years and still yield such abundant crops of hay that their owners would consider it a great damage to have them plowed. In this country of severe winters and hot, droughty summers, we cannot keep such permanent meadows or pastures, and the successful dairyman must use the plow in order to grow good grass and secure the best results from his business. I am aware that some good farmers advocate plowing and reseeding fields without taking any grain crop at all, but the wise dairyman will not refuse to take two good crops of grain from a rich, well-plowed field, when they can be raised at a profit, and a good seeding to grass obtained at the same time.

Steam plows have been successfully used in England and Scotland, the work being done by the owners of the plow at so much per acre, cheaper and better than horses. There is not much doubt that steam plows, greatly improved over those now in use, will, at no distant day, be generally employed in the great West, where they can be used to better advantage than in Great Britain. They will never come into common use in northern Pennsylvania because Providence has interdicted it by making the surface of the country so uneven and full of rocks. There was a time when it took the price of two bushels of grain to transport one bushel from the Western farms to the markets of the East, and those high rates of transportation furnished a protection to the Eastern farmer; but that time has passed and will never return again. The sharp competition for through freight between the rival trunk lines has reduced the price of transportation to such an extent that frequently it costs less to ship grain from Chicago to the seaboard than from most any of the intermediate points, and it has seemed as though the farther a farmer lived from market, the better was his condition,—

that instead of it being an advantage to live near the Atlantic cities it is really a misfortune.

Farmers and millers at Wyalusing have paid twenty-two and one half cents per one hundred-weight by the car-load on buckwheat and buckwheat flour shipped to New York, when the regular freight charges by railroad on the same class of goods was but twenty cents from Chicago to New York. The difference in cost of transportation between the railroad routes and the water routes is so great that the West will not long be satisfied with the limited facilities afforded by the Erie canal, but will be likely in a few years to compel the general Government to enlarge the Erie to a ship canal, and also enlarge the Hennepin canal, which connects the Mississippi and the Great Lakes, and when so enlarged would greatly cheapen the rates of transportation west of Chicago and thereby lessen the price of grain in the East. The average freight on wheat from Chicago to New York, for the year 1884, by lake and canal, was six and one half cents per bushel; by all rail it was fourteen cents. The farmers of northern Pennsylvania, had they shipped wheat to New York, would have been obliged to pay nearly double the latter and three times the former, or water rate.

The force of public opinion, legislation, or a sense of justice on the part of the railroad corporations themselves, may in time remedy these unjust discriminations against us in freight rates, but nothing can remedy the steepness and roughness of much of our hillside farms and place them on an equality for cheap grain-raising with the rich and easily-cultivated plains of the West.

Mr. William H. Brewer, who prepared the report on cereals for the census of 1880, says: "Those portions of the United States producing the bulk of the grain have soils of reasonable fertility, but are those also which are easily tilled and upon which the best machinery and labor-saving appliances can be most readily used." Mr. William J. Fowler, in the *Country Gentleman*, says: "The cause of trouble is growing in competition with farmers in localities where commercial fertilizers are not needed."

Unless some great and general calamity or insect pest should come upon wheat in the wheat-growing countries of the world, or unless they should be devastated by war, there is not much prospect that wheat and flour will be much higher for years to come than now. So long as we have any supplies to sell, the foreign market will regulate the price here.

Great Britain, our principal customer, has lines of steamships to every wheat-growing country, and we must underbid Australia, India, Egypt, and Russia, in order to sell her our supplies.

Can we afford to do this?

The average yield of winter wheat in Russia is from eleven and one half to eighteen and three fourths bushels per acre, and of spring wheat from twelve and one half to sixteen and two thirds bushels per acre. The average of spring and winter wheat in the United States for the year 1883 was eleven and six tenths bushels, and the average for eleven years was but twelve and two tenths bushels, so that the Russian farmer not only has a larger average yield per acre than we have, but has the advantage of cheaper labor.

The average yield of wheat in India is eleven and two thirds bushels per acre, or a trifle less than the average in the United States, but labor is very low there, and the actual cost of raising wheat ranges, according to the best authorities, from forty-five to sixty cents per bushel.

The export of wheat from India has increased from a few hundred thousand bushels, ten years ago, to over thirty-nine millions of bushels in 1884.

Railroad charges on wheat in India average about twenty-four cents per bushel, and transportation from Calcutta to London is about thirty cents per bushel.

Were it not that the railroad charges and ocean freights were higher on wheat from India than from America, the exports from that country would have been much greater, but competition will soon bring down the price of transportation there, as it has here, and the wheat-growing capacity of that great country can be increased, it is said, to almost any extent, when new railroads are completed to get the grain to market.

The West can raise and send corn here cheaper than we can raise it to sell off the farm. In February last, we bought a car-load of splendid Kansas corn, delivered on the Sugar Run switch, for fifty cents per bushel, and one last week for fifty-five cents. The West can raise oats cheaper than we can afford to, and will soon drive us from our markets in the coal regions. It is folly for us to contend with the Western farmers for the possession of the foreign and domestic grain markets. A bad season in the West, and a good one here, might help us for the time being; but the relief would be only temporary, and, like a crust of bread given to a famishing man, would but increase the pangs of hunger and show us the extent of our misery. But Providence is not so partial in the distribution of favors as some people may suppose.

Every place has its natural advantages, if they are only sought after and found. Northern Pennsylvania lies in the dairy belt where the grasses are sweeter, and springs of pure, soft water are abundant; with shade trees and running streams, so refreshing and grateful to cattle in hot weather, and so favorable to increase the quantity and quality of milk, butter, and cheese. Dairy products are produced to a considerable extent in the South and in the West, but, owing to the coarser, ranker nature of the grasses, the limestone or alkaline impregnation of the water, the absence of shade trees and wind-breaks, the different climate, or all these causes combined, render their dairy products, as a general thing, inferior to ours. I am aware that creamery butter is made at Elgin, in Illinois, and at some creameries in Iowa, which compares very favorably with Bradford county butter. So, good oranges have been raised in Pennsylvania in glass-houses, with great care and pains, but they can be raised cheaper and better in Florida, the more natural place, where the conditions are more favorable The Elgin butter is but an exception to the rule that the great mass of Western butter is poor and hardly fit for human food.

Most of us farmers are in the habit of milking, more or less, and think we know all about the dairy business, and how much milk, butter, or cheese a common cow will average per day or per year: but if we were called before a court to give evidence, I fear we would have to admit that a good deal of our knowledge is guess-work or hearsay, and that we have no reliable statistics of our own; and although we might be able to tell the amount of our *sales*, we would have to guess at the amount consumed by our families. In such case, the court would probably dispense with our testimony, and call on witnesses who had used their scales and measures at every milking, and had kept an exact record of every pound of their dairy products produced, sold, or used in their families, with the amount of their cash receipts, the value of feed, and the sums paid for hired help. Such a man was Zadoc Pratt, of Prattsville, Greene county, New York, who has furnished the public with the record of his dairy business from 1857 to 1863, inclusive, a period of seven years. Few farmers keep such exact records of their business, and when a man is found who *does* keep accurate accounts for a long series of years, he becomes a public benefactor, and deserves to have his name handed down to posterity along with the names of Fulton, Morse, and Howe.

I have selected his statistics, not because I could find nothing of a later date, but because the conditions under which he carried on the dairy business were similar to the conditions which surround us. His farm was on the eastern slope of the Catskill mountains, and occupied two hillsides, with an interval between them, through which ran a little brook. As he kept fifty cows the first six years and eighty cows the seventh year, I have found it easier to take the first six years and fifty cows and make a general average for the six years, as follows:

Average quantity of milk per day for each cow for eight months,	18.0 lbs.; or 9.46 qts.
Average weight of butter per day from each cow for eight months,	11.48 oz.
Average value received for each quart of milk made into butter,	1.77 cts.
Average number pounds butter from each cow for season of eight months,	180 lbs.
Average price received for butter for six years,	24.2 cts.
Average amount of cash received for butter from each cow per year,	$43 56
Average amount of pork fattened from milk of each cow per year,	129 lbs.
Average price received for pork,	10 cts. per lb.
Net profit on fifty cows each year, for six years, after deducting all expenses and allowing $700 for the interest on the capital invested,	$1,439 32
Average net profits per annum on each cow over all expenses,	$28 78

His seventh year, 1863, owing to the higher prices caused by the war, was the most profitable of all. His net profits on eighty cows, after paying all expenses and allowing seven hundred dollars for interest on the investment, were three thousand seven hundred and four dollars and forty cents.

As he valued his cows and farm at ten thousand dollars, it is plain to see that his cows were more valuable than bank stock, Government bonds, or a California gold mine, his net profits on his capital being forty-four per cent. per annum for the year 1863, and 21.4 per cent. per annum for the previous six years. When we bear in mind that he commenced business in 1857, a year of great business depression, and that the first four years, out of seven he followed it, were previous to the war and high prices, we can readily admit that his tables are safe ones to go by if we only practice the same care and economy.

His cows were native stock, he had no cattle to sell, no motive to misrepresent, and, so far as I know, his statements have never been disputed.

There is nothing in his practice, the amount of his production, or the price he received, which we may not equal, if not excel. The average price he received for butter, 24.2 cents per pound, was not excessive.

The average price for New York State butter in New York, for the year 1884, according to the statistics of the Agricultural Department, was twenty-six cents per pound, and Bradford county butter is fully equal to it.

The experiments of associated dairying have, in the majority of cases, proved even more successful than individual dairying. The following report of Mr. E. S. Munson, superintendent of the Franklin creamery, Franklin, New York, for the season of 1870, is to be found in the report of the Commissioner of Agriculture for 1871:

Average number of cows,	880
Pounds of milk received for season, five months,	2,310,569
Pounds of butter made,	78,459
Pounds of cheese,	124,966
The average price of butter was nearly,	39 cents.
The average price of cheese per pound,	8½ cents.

Taking the season as a whole, the patrons netted one dollar and thirty-three cents to one dollar and thirty-five cents for one hundred pounds of milk, or a net return of nearly three cents per quart for milk supplied.

The following statement was prepared by the Hon. J. S. Vanduzer, the owner of a butter factory near Elmira, New York, and published in the Elmira *Daily Advertiser*, January 30, 1874: "Mr. Samuel Sayres delivered at our factory from March 25 to November 29, 1873, 38,374 quarts of milk, which, at the prices we paid him, netted $964 11, or over $80 per cow. We buy milk on the basis of a pound of butter from 12 quarts of milk. The average net price we paid for butter at the factory was a fraction over 30 cents per pound, or 2½ cents per quart for the milk. Mr. Sayres' cows were giving on an average of six quarts of milk on the 1st of December. Mr. Hendricks, who sold us the milk of four cows, received net proceeds $324 41, or $85 61 per cow. Mr. James E. Whitley received over $70 per cow".

It must be admitted that in 1870 and in 1873, the currency was still somewhat inflated, but if we reduce the price of three cents per quart at the Franklin creamery, and the price of two and one half cents per quart at the Elmira creamery, to a gold basis, we shall find that the patrons of these creameries received better prices for milk than Mr. Pratt, whose average for six years was not quite two cents.

In a letter from the Hon. J. S. Vanduzer, dated June 9, 1885, he says: "We now have about six hundred cows supplying milk at our creamery, and are conducting it on the coöperative basis. Last year our milk netted the partners two and one tenth cents per quart, the year before nearly two and one fourth cents per quart. We get all the butter we can out of the milk, and then make the skim milk into cheese, also working some buttermilk into the cheese in the spring and fall, and, if the cheese is not to be held, also in the summer. We aim to make an 'A No. 1' article of butter, and ship it all to New York."

The following statement was prepared for me by Mr. W. S. Lester, the gentlemanly and energetic manager of the Troy creamery, Troy, Bradford county, Pa., S. H. Heywood, proprietor:

"We had the cream from about one thousand four hundred cows during the season of 1884. We do not make cheese, butter only. The average price paid dairymen at the farm, from April 1 to December 1, for the amount of cream that made a pound of butter was twenty-two and one half cents. We do not buy cream by the gauge, as many do, but allow the dairymen just what butter his cream will make. On the gauge plan, the dairyman who uses plenty of ice will raise so much of the poor cream along with the rich, that a gauge of his cream will not make quite a pound of butter; and the man who uses no ice, or a spring of running water, his gauge of cream, all through hot weather, will overrun a pound of butter from twenty to thirty per cent. The gauge is not an accurate measure for milk set at different temperatures. Our standard dairies last year netted their owners between forty dollars and fifty dollars per cow for the butter sold, and the milk was left on the farm sweet, for raising calves and hogs."

The following record was kindly furnished by Mr. Jesse T. Stalford, of Wyalusing, Pa., a person whose statements can be implicitly relied upon as being careful, conscientious, and exact:

Received, commencing the 1st day of May, 1883, and ending the 30th day of April, 1884.

Number of cows kept,	14

13 of them grade Jersey and 1 native.
4 of the cows 2 years old.
2 " " 3 " "
4 " " 4 " "
1 " " 9 " "

Sold 5,802 quarts of cream, at 10 cents per quart,	$ 580 20
" 18,629 " " milk at 3 and 4 cents per quart,	692 42
Raised 4 calves, worth at 1 year old,	100 00
" 5 hogs,	50 00
Amount of receipts,	$1,422 62
Deduct value of feed other than hay and pasture,	200 00
	$1,222 62

Average cash receipts from each cow, eighty-seven dollars and thirty-three cents, after deducting value of feed other than hay and pasture. He states that he raised enough grain, potatoes, and meat to supply his own family, besides selling enough to pay all his hired help, blacksmith bills and wear and tear of farm implements.

He values his farm and cows at about seven thousand dollars. His clear profits, after deducting all expenses and four hundred and twenty dollars, the interest on the capital invested, was eight hundred and four dollars and sixty-two cents, or nearly seventeen and one half per cent. per annum interest on his capital.

Every farmer is not situated near a railroad so that he can sell his milk and cream like Mr. Stalford, but had Mr. Stalford made his milk and cream into butter like Zadoc Pratt, his profits would have been but a little less than they were, and large enough to satisfy any reasonable man.

He states that eight quarts of his cows' milk will make one pound of butter, and consequently would have made three thousand and fifty-four pounds of butter, which, at the average price of good butter in New York, for the year 1884, twenty-six cents per pound, would have brought,	$794 04
He could have raised all his calves, worth,	350 00
And the same number of hogs he did raise,	50 00
	$1,194 04
Deduct value of grain fed,	200 00
Or an average value for each cow's product, after deducting grain fed—$71,	$994 04

Mr. J. C. Straight, proprietor of a milk, cream, and butter depot at Elmira, New York, very obligingly furnishes the following: I buy the milk from three hundred cows; pay two cents per quart till the first of November, and then three cents per quart till the first of April.

According to a test made a short time ago, eleven quarts of milk made one pound of butter.

The creamery established at Wyalusing a year ago was not a success financially to the proprietors. I think it was started without a contract for the milk of a sufficient number of cows. It requires the milk of five or six hundred cows to make a factory profitable to the owners.

The people of northern Pennsylvania have not been entirely ignorant of the advantages of dairying. According to the census tables of 1880, the number of cows kept and the amount of dairy products in the northern tier of counties in the year 1879 were as follows:

Counties.	Number of cows.	Butter made on farms.	Cheese made on farms.	Milk sent to butter and cheese factories or sold
Bradford, ...	38,472	4,824,656 lbs	19,264 lbs.	469,112 Galls.
Tioga, ...	23,738	2,901,272 "	68,367 "	238,964 "
Susquehanna, ...	27,325	2,979,048 "	17,100 "	70,909 "
Wayne, ...	14,199	1,423,753 "	5,042 "	54,643 "
Potter, ...	8,959	884,303 "	16.172 "	417,812 "
McKean, ...	4,210	360,994 "	16,442 "	240,984 "
Warren, ...	10,294	1,253,874 "	4,260 "	184,071 "
Erie, ...	25,425	2,201,141 "	72,796 "	1.893,631 "
Totals for the 8 counties, ...	152,622	16,829,041 "	219,443 "	3,570,125 "

About one twenty-second part of all the cows in the State of Pennsylvania are owned in Bradford county, which leads every other county in the number of its cows except Chester, and one sixteenth of all the butter made on farms in this State is made in Bradford, which exceeds Chester and every other county in the amount of butter produced, and its quality is not excelled by any.

Reading columns of figures is not an interesting entertainment for an audience, any more than reading the tables from an old almanac, but figures are useful when they tell the truth, and I hope you will pardon me for introducing a few more.

The following statistics of the number of cows, (the amount of daily products and grain raised were obtained from the census of 1880, and the prices are stated to be the average farm prices in the State,) were taken from the report of the Department of Agriculture for the year 1879.

There were owned and kept in the counties of Bradford, Susquehanna, Tioga, and Erie, on June 1, 1880:

114,660 cows, valued at $26 24 each, amounting to, . . .	$3,016,550
Number pounds of butter made on farms, ...	12,906,117 lbs.
Value of the butter, at 24 cents per pound, ...	$3,097,468
Number pounds of cheese made on farms, ...	177,527 lbs.
Value of the cheese, at 7 cents per pound, ...	$12,426
Number gallons of milk sold or sent to factories, ...	6,672,616
Value of the milk, at 2 cents per quart, ...	$533,809
Total value of dairy products in four counties for the year 1879, ...	$3,643,703

There was raised in the same counties in the year 1879—

631,606 bushels wheat, valued at $1 32 per bushel, . . .	$833,719	92
2,220,260 bushels corn, valued at 54 cents per bushel, . . .	1,198,940	40
3,527,966 bushels oats, valued at 36 cents per bushel, . . .	1,270,067	76
82,755 bushels rye, valued at 68 cents per bushel, . . .	56,273	40
831,508 bushels buckwheat, valued at 60 cents per bushel,	498,904	80
265,996 bushels barley, valued at 83 cents per bushel, . .	220,776	68
Total value of all the grain in the four counties, . . .	$4,078,682	96

Taking out the value of the buckwheat, which has no competition from the West, the dairy products exceed in value all the grain raised by nearly sixty-four thousand dollars.

It will be observed that the census gives no account of milk, cream, and buttermilk used in the family or fed to calves and hogs. If we had a fair account of these, there is no doubt that the value of the dairy products in the counties of Bradford, Susquehanna, Tioga, and Erie would far overbalance the value of all the grain raised in them, and also produced at a less expenditure of labor and loss of fertility from the soil.

I have endeavored to show that, from the year 1857 down to the present, in good times and in bad times, dairying has been profitable in the dairy regions of Pennsylvania and New York when carried on by men of intelligence, experience, and proper energy. I am sorry that I am not able to show what the profits of grain-raising, if any, have been in the same regions. The manufacturer can tell the cost of a yard of cloth or a ton of iron to the tenth part of a mill. The dairyman can compute the cost of his products with reasonable certainty, but the exact cost of raising a bushel of grain is a problem which has never yet been solved. There are so many varying conditions, so many different influences, so many uncertain factors and unknown quantities that enter into the calculation, that no farmer living can tell exactly what a bushel of grain costs, unless he buys it in the market. He cannot tell how much it cost to raise a bushel last year, nor how much it will cost to raise one next year. The value of the land varies in the same locality, and even on the same farm, the price of seed, the price of labor and team work vary, the amount of rainfall and snow fall, of heat and cold, vary; the amount of damage from storms and frosts, from birds, and worms, and insects, from diseases, from rust, and smut—evils over which we have but limited control—vary in different seasons and in different localities. If a farmer manures a field with barnyard manure at one dollar, or guano at fifty dollars per ton, he can never tell with absolute certainty how much of its cost to charge to the first crop, or how much to the second or third. The Dakota farmer merely figures up what it cost to plow, sow, and harvest, and market his crop. The value of the precious and indispensable constituents of his soil, which he is selling with his wheat and which he must buy back again some day, does not enter into his calculations at all.

I do not wish to underrate the grain-growing capacity of the region in which I live.

The records of the Bradford County Agricultural Society show that in the year 1884:

Robert Templeton raised 52 bushels corn on 1 acre.
" " " 28 " red winter wheat on 1 acre.
" " " 100 " oats on 1 acre.
George Campbell raised 34 bushels buckwheat on 1 acre.
" " " 29 " rye.
" " " 39 " barley.
" " " 27 " spring wheat.

I am not here to say that such grain-raising, if it could be kept up from year to year, with reasonable certainty, and without the cost of too much labor or manure, would not be profitable, but I assert my belief that it is more profitable to feed it to cows at home than to sell it off the farm.

It must be remembered that these were premium crops, which are not apt to be stinted with labor or manure, and which may not be so very profitable even though they draw the prizes. "On ordinary farms, it pays to 'farm better,' up to a certain point." Says Mr. Brewer, this passed "increased production is only secured at an uprofitable expenditure." The average number of bushels of grain per acre raised in Pennsylvania, in 1883, and average price in the State was as follows:

Wheat, average per acre, 13.2 Average price in the State, $1 08. Value per acre, $14 26.

Rye, average per acre, 10.1. Average price in the State, 70 cents. Value per acre, $7 07.

Corn, avarage per acre, 27. Average price in the State, 67 cents. Value per acre, $18 09.

Oats, average per acre, 30.6. Average price in the State, 40 cents. Value per acre, $12 24.

Buckwheat, average per acre, 9.8. Average price in the State, 85 cents. Value per acre, $8 33.

In 1884, the only crops reported by the Department of Agriculture, which I have seen, were as follows:

Wheat, average bushels per acre, 1.32. Average price, 86 cents. Average value per acre, $11 61.

Corn, average bushels per acre, 30. Average price, 54 cents. Average value per acre, $16 20.

Oats, average bushels per acre, 27.9. Average price, 30 cents. Average value per acre, $8 37.

This is not a very good showing for a productive year: eight dollars and thirty seven cents per acre for oats, sixteen dollars and twenty cents for corn, and eleven dollars and sixty one cents, for wheat.

As south-east Pennsylvania has a deep soil full of fatness and fertility, and always raises more than these averages, it is probable that northern Pennsylvania does not raise the average, and a question of deep interest to us all is how much less than these averages can we raise, make a living and pay our taxes, to say nothing about profits. There are much fewer risks in dairying than grain-farming. Grass is a surer crop than grain, having fewer enemies to contend with, and being less likely to winter kill, drought being the only thing that seriously injures it, and this can be guarded against by providing a good supply of fodder corn. It may be said that the dairy business, like every other business, can be overdone. So it may, but the dairymen of northern Pennsylvania have natural advantages, conferred upon them by the hand of the Almighty, and are in the business to stay. Should it ever become overcrowded and necessary for any to retire, there will be the survival of the fittest, and the Western dairymen must go. It is my firm conviction, after giving the subject much thought, that in northern Pennsylvania we should make dairying our principal business, and let the farmers of the West struggle with each other for the possession of the foreign and domestic grain markets, so long as they see fit; and while they are shipping away to Europe the life-blood of their land, the very cream of their soils, we will only ship off the cream of our milk, and our farms, instead of becoming impoverished and sterile, like the cotton and tobacco lands in the South, will become richer year by year, and yield bountifully, when required, the crops necessary for our own bread and the feed for our cows.

Should any person desire information which I am able to give, they will oblige me by writing their questions on a slip of paper.

REPORT ON MILK.

By PROF. C. B. COCHRAN, *West Chester, Microscopist and Food Inspector of the Board.*

The majority of our foods are complex bodies capable of separation by comparatively simple methods into several distinct substances, each of which is a partial food and is capable of supplying some nourishment to the body. These partial foods are called by the physiologist alimentary principles, and are usually divided into the following classes:

The carbohydrates, including cellulose, starch, inulin, dextrin, gums, and sugar in its various forms; the hydrocarbons, including the animal and vegetable oils and fats; the albuminoids, including albumen, and animal and vegetable casein, and fibrin; and the compound substances, gluten, legumin, avenin, etc., which in reality are compounds of several distinct albuminoids; and lastly, the inorganic alimentary principles, such as water calcium phosphate, sodium chloride, compounds of magnesium, iron, potassium, etc.

Each of these classes has, at least in part, a distinct use to perform within the body; and the human organism, or indeed that of any other higher animal, cannot be maintained in health without receiving representatives of each class.*

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*With regard to the necessity of all four classes of aliments, it can be affirmed with certainty that (putting scurvy out of the question) men can live for some time and can be healthy with a diet of albuminates, fats, salts, and water. But special conditions of life, such as great exercise, or exposure to very low temperature, appear to be necessary, and under usual conditions of life, health is not very perfectly maintained on such diet. It has not yet been shown that men can live in good health on albuminates, carbohydrates, salt and water, etc., without fat. (Parkes Manuel of Hygiene.)

If a food supply the requisite variety and amount of mineral matters, together with representatives of each of the other groups in the proper amount, it is a complete food; but if one group is entirely wanting then the food becomes incomplete and unable to sustain life for any prolonged period of time.

Of all foods milk is probably the most complete, since it contains alimentary principles of each class, and, as experience has shown, in proper portion to maintain life for a long period of time.

Cow's milk, being an article of almost universal use and the only nourishment of thousands of children, is an exceedingly important food; and all questions concerning those conditions which influence the character and amount of milk, or concerning the characteristics and relative values of the milk of different breeds or different individuals, are questions of great practical importance.

Of the oleaginous substances, milk contians butter-fat (a body of complex composition containing several varieties of fat). Of the albuminoids, it contains casein, milk albumen, and lacto-protein, the last two being present only in small quantities; while representing the saccharine class we find lactose (or milk-sugar). The albuminoid, the fatty, and the saccharine matters of average milk are each present in amounts varying not far from four per cent., while the mineral constituents are about sixty-four one-hundredths per cent. We have only to remember these two numbers and to what each applies, and we can give an intelligent statement concerning the compostion of milk.

The following table, showing the composition of cow's milk, is copied from the first annual report of the New York State dairy commissioner:

Water,		Inorganic foods.
Potash,	Ash.	
Soda,		
Lime,		
Magnesia,		
Phosphoric acid and chlorine in combination with the above,		
Fat,	Hydrocarbon,	Organic foods.
Sugar,	Carbohydrate,	
Casein,	Albuminoids.	
Albumen,		
Nuclein,		
Lacto-protein,		

We can see, then, that it contains all of the elements of a mixed food.

The water is the same as ordinary water.

The fat is the butter, and consists of a mixture of the following fats or glycerides of the fatty acids:

Myristin.
Palmitin.
Stearin.
Arachin.
Olein.
Butyrin
Caproin.
Caprilin.
Rutin

An analysis of milk usually includes a determination of the per cent. of the following substances: water, total solids, fat, solids not fat, sugar, casein, and ash. Under the term casein is included all the albuminoid constituents of milk.

Tables representing the average results of such analyses as given by different analysts show a considerable difference in the average composition of milk.

The following table, representing the average composition of milk as given by different authorities, is taken from the same report as the preceding table:

AUTHORITY, OR ANALYST.	Number of cows.	Water.	Total solids.	Fat.	Solids not fat.	Sugar.	Casein.	Salts.
James Bell, ...	216	87.17	12.83	3.83	9.00	......	......	0.71
James Bell, ...	24 dairies.	86.78	13.22	4.12	9.10	......	......	0.72
C. Estecourt, ...	22 "	87.26	12.74	3.37	9.37			
J. Carter Bell, ...	183	86.40	13.60	3.70	9.90	......	......	0.76
J. Cameron, ...	42	86.53	13.47	4.00	9.47			
C. Cameron, ...	40	87.00	13.00	4.00	9.00	4.28	4.10	0.62
C. Cameron, ...	100	86.75	13.85	4.60	9.25			
Fleischmann & Veith,	120	87.78	12.22	3.20	9.02			
Veith, ...	60	87.20	12.80	3.10	9.70			
Veith, ...	9,120	86.97	13.03	3.52	9.51			
Wanklyn, ...	Average.	87.50	12.50	3.20	9.30			
A. Wynter Blyth, ...	"	86.87	13.13	3.50	9.63			
Marchand, ...	"	87.15	12.85	3.55	9.30			
Henry & Chevalier, ...	"	87.02	12.98	3.13	9.85	4.77	4.48	0.60
Vernois Becquerel, ...	"	86.40	13.60	3.60	10.00			
Payen, ...	"	86.60	13.40	3.50	9.90			
O. C. Wiggin, ...	58	85.92	14.08	4.01	10.07	4.29	4.99	0.79
E. Calder, ...	27	87.23	12.77	3.32	9.45			
Sharpless, ...	34	85.85	14.15	4.62	9.53	4.82	4.06	0.65
Haidlen, ...	Average.	87.30	12.70	3.00	9.70			
Letherby, ...	"	86.00	14.00	3.90	10.10	5.20	4.10	0.80
J. Konig, ...	"	87.30	12.70	3.00	9.70	5.00	4.00	0.70
Boussingault, ...	"	87.40	12.60	4.10	8.50	5.10	3.20	0.70
Muspratt, ...	"	86.43	13.57	4.43	9.14	4.78	3.74	0.67
Dieulafait, ...	"	87.64	12.36	3.11	9.25	4.22	4.18	0.85
Gorup Bezanez, ...	"	85.70	14.30	4.31	9.99	4.04	5.40	0.55
Brinton, ...	"	86.00	14.00	4.50	9.50	3.50	5.50	0.70
Chandler, ...	1,700 qts.	87.45	12.55	3.83	8.72			
Newton, ...	Average.	87.50	12.50	3.50	9.00			
Bartley, ...	"	87.50	12.50	3.50	9.00			
White, ...	"	87.50	12.50	3.50	9.00			
Waller, ...	"	87.50	12.50	3.20	9.30			
Babcock, ...	"	85.53	14.47	5.09	9.39	5.15	3.57	0.67
Church, ...	"	86.30	13.70	3.70	10.00	5.10	4.10	0.80
Edward Smith, ...	"	86.40	13.60	3.61	9.90	3.80	5.52	0.66
Martin, ...	"	86.50	12.50	3.20	9.30	......	......	0.67

It would be no difficult matter to make the variations still more decided by further selections. If we examine the composition of milk as found in different herds, or in individual cows, without regard to breed, we find a far wider variation.

During the year 1883, monthly analyses of the milk of twelve herds of cows were made at the New Jersey agricultural experimental station, and from these analyses Prof. George H. Cook reports the highest per cent. of total solids found as 15.47 per cent., and the lowest as 11.67 per cent.

The highest percentage was obtained from the mixed milk of thirty cows, and the lowest from the mixed milk of eighteen cows. We must remember that these figures represent the variation in the milk of herds of considerable size. Individual cows show a still greater variation.

The following table, copied from a pamphlet on milk analysis, written by Stephen P. Sharpless, shows a great variation in total solids and in solids not fat:

NAME OF CHEMIST.	LOCALITY.	Number of analysis.	TOTAL SOLIDS.		SOLIDS NOT FAT.	
			Highest.	Lowest.	Highest.	Lowest.
Dr. Voelcker, ...	England, ...	22	14.00	9.3	9.88	7.51
Dr. MacAdam, ...	England, ...	66	15.54	10.57	11.23	8.74
Von Baumhauer,....	Holland, ...	162	13.23	10.18	8.93	8.08
Vernois & Becquerel,.	France,........	46	19.68	11.70	10.56	7.73
Vaughan, ...	Rhode Island,...	58	16.96	12.85	11.14	8.79
Sharpless, ...	Boston, ...	22	19.34	11.64	11.42	7.88

The highest average total solids was obtained by Prof. Sharpless, of Boston. He found 14.49 per cent. as the average per cent. of total solids in twenty-two samples. The lowest average total solids was 11.3 per cent. This was obtained by Von Baumhauer as the result of one hundred and sixty-two analyses.

In my own work I have found the following variations in the per cent. of the constituents of milk:

TOTAL SOLIDS.		SOLIDS NOT FAT.		FAT.		CASEIN.	
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
23.56	11.29	14.63	7.68	8.93	2.09	10. 3	3.41

SUGAR.		MINERAL MATTER.		SPECIFIC GRAVITY.		CREAM.	
Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
4.97	3.3	.901	.52	1,039	10,277	68	7.5

The milk giving the remarkably high amount of 23.56 per cent. of total solids was a sample sent to me from the State fair of 1884, and I was told that it was taken from a single cow, giving at the time only about one pint of milk.

The same milk yielded 14.63 per cent. of solids, not fat; 8.93 per cent. of at; 10.43 per cent. of casein; 3.3 per cent. of sugar, and .901 per cent. of mineral matter. This milk gave sixty-eight per cent. of cream, and had a specific gravity of ten hundred and thirty-nine at 56° Fahr. After souring, it appeared like a solid mass, while nine other samples that I had on hand at the same time separated into an upper layer of curd and a lower layer of whey.

The following seem to me to include the possible causes of variation in the composition and quantity of milk:

First—Variations in character and amount of milk depending on breed of stock.

Second—Variations depending on individual cows.

Third—Variations depending on time since calving, pregnancy, or other uterine changes.

Fourth—Variations depending on season of year.

Fifth—Variations depending on amount and kind of food.

Sixth—Variations due to temperature and other atmospheric conditions.

Seventh—Variations between morning's and evening's milk, dependent upon daily cycle of changes, within the animal organism.

Eighth—Variations depending on hygienic conditions, under which the animals are kept.

Ninth—Variations depending on age of animals.

Perhaps these are not all necessary causes of variation, but they appear to me to be causes that may effect either the character or the amount of milk, and are all worthy of careful consideration.

Before proceeding to discuss this question of the causes of variation in quality and quantity of milk, as based upon the results of analyses of myself and others, a brief outline of a few of the many methods of analysis now in use will be given.

Methods of Analysis.

Of the very numerous methods used in the analysis of milk, the one adopted by Dr. Waller is among the most practical. This method combines the three excellencies, rapidity, simplicity, and accuracy, and, in a more or less modified form, is used by the majority of American chemists. The following is a brief description of this method :

Weigh out about five grammes in a flat-bottomed platinum dish, evaporate to dryness on water-bath, dry to constant weight in hot-air oven at temperature of 100° C., cool, and weigh. Weight of dish and milk minus weight of dish and solids equals weight of water.

Extract the milk solids repeatedly with ether, decant the ether into a weighed beaker, dry the residue, and weigh. Loss equals amount of fat. Evaporate ethereal extract in a weighed beaker, dry, and weigh ; weight minus weight of beaker equals fat. The residue left in the platinum dish after extraction with ether is the solids not fat. This is treated with a mixture of equal parts of alcohol and water, and evaporated to dryness on the water-bath, in order to render the albumen and casein insoluble.

A ten per cent. solution of alcohol in water is now added, and the dish, with its contents, warmed for some time to dissolve the sugar and soluble salts. The solution is then decanted into a weighed platinum dish. After repeating this operation three or four times, to dissolve the soluble portion, the residue is dried and weighed ; this gives the weight of casein and insoluble mineral matter. Ignite at a low, red heat and weigh again ; the loss of weight gives the casein, and the present weight minus the weight of the platinum dish gives the weight of the insoluble mineral matter.

We now evaporate the solution of sugar and soluble salts to dryness, and dry to constant weight at 100° C., and note the final weight. Ignite at low, red heat until a white or gray ash is obtained, cool, and weigh; the weight of the dish containing the dry residue minus the weight of dish and ash equals the weight of the sugar.

Subtracting the weight of the dish from the weight of dish and ash gives the weight of the mineral matter, which was dissolved along with the sugar.

Add the weight of this mineral matter to the weight of the insoluble mineral matter and we have the total mineral matter.

Rittenhausen's Method.

Weigh out 10 or 20 c. c. of milk, dilute to twenty times its original volume, and add to it 4.5 or 9 c. c. of acetate or of sulphate of copper.

The acetate should contain 50 grms. of the salt per litre, the sulphate 63.5 grms. per litre. Immediately after the addition of copper, just enough caustic alkali is added to decompose the copper salt, but must not be added in excess, for this would dissolve the precipitated casein copper. The clear fluid is now decanted, the precipitate of copper, protein substances, and fat thoroughly washed with water and brought upon a filter. The filtrate and washings contain all the milk sugar, which may be determined with Fehling's solution.

The precipitate is broken up with a platinum spatula and washed with absolute alcohol and then with ether, until all the fat has been removed. The last traces of ether are then removed with alcohol and the residue dried over sulphuric acid. The ethereal solution is distilled and fat residue dried and weighed. The copper, etc., residue is weighed, heated to one hundred and twenty-five degrees for one or two hours and then to redness, whereby the albumen is burned off and the amount determined on weighing the residue. Water and total solids are determined in the usual manner with sand.

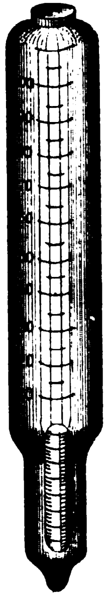
The following is an outline of the method pursued by Dr. Dechan and T. Maben, and copied from October number of *The Analyst* for 1884:

The total solids are determined separately in a shallow vessel with a flat bottom, the quantity of milk taken being 5 grms. The vessel is large enough to allow the residue to form in a thin film, and there is no difficulty in obtaining weighings which correspond with the weight of the fat and non-fat solids. This, therefore, forms a good check, being for all practical purposes a duplicate analysis.

For the fat, and solids not fat, 10 grms. are weighed into a capsule capable of holding double that quantity. This is placed on an open water-bath and the milk stirred repeatedly during evaporation. By this means a granular residue is obtained, which, when reduced to powder, is in the best possible condition for the extraction of the fat. This we accomplish with ether, by means of one of the many forms of extraction apparatus modeled on the principle of Soxhlet's tube. The fat and solids not fat are determined separately, both being dried till they lose not more than 0.001 grm. in an hour.

The conclusions reached by Dechan and Maben are as follows:

1. That the total solids be determined separately, and, if time be specified, that the quantity in weight of milk and the shape and size of the evaporating vessel be stated.
2. That the solids for fat extraction be obtained in a fine granular condition by repeated stirring during evaporation. Using ten grms. of milk, the time necessary for this need not exceed one and one half, or, at the very utmost, two hours.
3. That the fat be extracted in some such apparatus as we have recommended; time allowed for extraction to be from one and one half to two hours.



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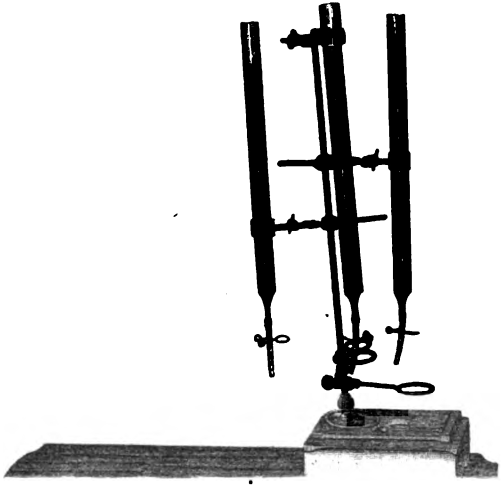


TUBES FOR DRAWING AWAY SKIMMED MILK FROM CREAM.

4. That all the constituents be weighed, viz: Total solids, fat; solids not fat, and ash. This gives practically duplicate analyses and forms a valuable check on the accuracy of the results.

The methods of Mathew A. Adams has elicited some attention from English analysts.

Mr. Adams uses a carefully prepared and weighed coil of blotting-paper to absorb the milk taken for analysis, dries the coil, and then, by the use of ether or benzole, dissolves the fat from the residue left upon the coil, evaporates the solvent, and determines the fat by weighing.

He then carefully dries and weighs the coil, and from the data now furnished him determines the solids not fat. Among other advantages claimed for this method, are the following:

First—That the fat is completely extracted.

Second—That the last trace of water is removed from the solids not fat.

The following is the method of analysis used by myself:

In a wide, shallow, flat-bottomed, weighed, plantinum dish, weigh about five grammes of milk (much more than this amount renders complete dessication and extraction of fat slow and tedious, while, on the other hand, a much smaller quantity is not desirable as a basis for determination of ash). Place the dish, with its contents, over a water-bath and evaporate to a solid residue; from this residue expel the remaining water by heating in a hot-air oven at 100° C. I have usually allowed the residue to remain in the oven about an hour, and then weighed every fifteen or twenty minutes until two consecutive weighings gave the same result, when the milk solids were considered completely dry. From the weight of the dish and milk solids, substract the weight of the dish, and divide the remainder by the weight of the milk taken. This gives us the per cent. of total solids.

The dish is now filled with ether or benzole and allowed to stand under a bell-jar for two hours or more; the liquid is then decanted off from the residue, which is repeatedly rinsed with the same solvent, dried and weighed. This process is repeated until constant weight is obtained and the fat completely extracted. The residue now left in the dish is the solids not fat, whereas, the loss of weight sustained represents the amount of fat. From the data the percentage of fats and solids not fat are calculated.

The dish containing the solids not fat is now heated to dull redness until thoroughly decarbonized and a white or gray ash is obtained, cool and weigh; substract weight of dish and we have the weight of mineral matter.

For the estimation of lactose weigh out fifteen or twenty grammes of milk, dilute with equal volume of water, acidulate with five or six drops of acetic acid, and warm to coagulate the casein.

After cooling, filter and wash curd repeatedly to remove all traces of lactose, dilute, filtrate, including washings to one fourth or one half of a litre, and estimate lactose by use of Fehlings fluid.

Casein is estimated indirectly by substracting lactose and ash from solids not fat.

This method is recommended by Prof. Stephen P. Sharpless in a pamphlet on milk analysis, written by himself; and many duplicate analyses have been made by him to establish the accuracy of the method, at least so far as regards the power of obtaining concordant results.

The following are the results of two duplicate analyses made by Prof. Sharpless:

Cream per cent. by volume,	18 per cent.
Specific gravity,	1.030

	No. 1.	No. 2.	Average.
Sugar,	4.19	4.19	4.19
Casein and albumen,	5.17	5.23	5.20
Ash,	.72	.72	.72
Solids not fat,	10.08	10.14	10.11
Fat,	4.35	4.35	4.35
	14.43	14.49	14.46

A second sample of milk supposed to be adulterated, gave the following results:

Cream, volume per cent., ... 6 per cent.
Specific gravity, ... 1.021

	No. 1.	No. 2.	Average.
Sugar,	3.45	3.45	3.45
Casein,	2.78	2.79	2.785
Ash,	.48	.47	.475
Solids not fat,	6.71	6.71	6.71
Fat,	2.31	2.31	2.31
	9.02	9.02	9.02

Duplicate analyses, made by myself, gave results as follows:

	First trial.	Second trial.	First trial.	Second trial.
Ash,	.74	.72	.70	
Lactose,	4.3	4.3		
Casein,	4.904	4.97		
Solids not fat,	9.944	9.99	9.51	9.40
Fat,	3.476	3.48	2.72	2.75
Total solids,	13.32	13.37	12.23	12.15
Water,	86.68	86.63	87.77	87.85

I have made several other duplicate analyses, but the memoranda of all of them are lost, so that this is all that I am now able to give.

With regard to the use of ether and benzole, in my experience, I have found that ether dissolves the fat more quickly than benzole, but under ordinary conditions of analysis I do not think that in the end the action is any more complete than benzole.

Lactometer.

The lactometer is an instrument used for indicating the specific gravity of milk. At a temperature of 60° F. it indicates a specific gravity between 1000 and 10348. The stem of the lactometer is graduated from 0 to 120; 0 indicates the specific gravity of water, viz: 1000; the 100 mark indicates a specific gravity of 1029, specific gravity below which pure milk rarely falls, and 120 denotes a specific gravity of 10348, a point seldom reached by normal milk. 100° being supposed to indicate pure milk, when the lactometer sinks below this mark, it is usually taken as denoting a watered milk. If the lactometer stands at 80°, for example, it means eighty per cent. milk and twenty per cent. water.

Again, since the removal of fat renders milk heavier, a very high reading of the lactometer is regarded as an indication of the removal of cream. There are, however, other conditions which cause the reading of the lactometer to vary above and below the limits set for pure milk other than the mere skimming and watering of the milk, and the person testing milk by the lactometer must not lose sight of them.

Of these conditions we mention, first, temperature. The milk ought either to be brought to a temperature of 60° F., or else the temperature of the milk taken and then corrections made for the difference between the observed temperature and 60° F. Between 40° and 75° F. a difference of 3° in temperature makes a difference of 1° on the lactometer. An increase in the temperature above 60° F. lightens the milk, and the lactometer sinks too deeply, and its reading is too low, while a decrease below 60° F. renders the milk heavier, the lactometer does not sink so far, and its reading is too high. Consequently, for every 3° F. below 60° F. we subtract one from the observed reading.

Second. A milk unusually rich in fat, without a corresponding increase in solids not fat, will have a low specific gravity, and will give the same reading on the lactometer as a watered milk. There are several ways in which one may either accidentally or intentionally obtain such a sample as this. The milk given at the latter part of a milking is very rich in fat, and has a low specific gravity, as experiments given in another part of this paper will show.

The milk of strippers is frequently rich in fat, and of a low specific gravity. This fact should be borne in mind, for nearly all, if not quite all, the animals in a herd may, and frequently are, strippers at about the same time, and in the market milk from such animals may be met with.

Milk ought not then to be condemned on the indications of the lactometer alone. On the other hand, strippers sometimes give milk of an exceedingly high specific gravity; the milk of one stripper, examined by myself, gave a specific gravity of 1039. On account of the ease with which the fat separates from milk, great care must be used in obtaining the sample of milk, or else we shall get a sample containing a greater or less quantity of fat than the milk really contains. I have on some occasions analyzed samples of milk which I was certain were unfair representations of the milk, whose composition it was desired to ascertain, because the different layers of the milk were not mixed with sufficient care before the sample was taken. Since the fat lowers the specific gravity of the milk, if the sample happens to contain a little excess of fat, the specific gravity will be too low; if the fat has been removed it will be too high."

In the first annual report of the New York State dairy commissioner, Prof. Edward Martin makes the following statement:

"It has been said that many healthy cows give milk which has a less specific gravity than 1029."

"This I have failed to verify, either from my own or from the tests of others, as will be seen by reference to the tables of the specific gravity of the milk, and when such a statement is made it will be well to determine the following facts:

"*First*—Whether the milk in question was taken from strippers or unhealthy cows, or from cows that have just calved.

"*Second*—Whether the milk was tested at 60° F.

"*Third*--Whether on the lactometer, used, the 100 mark indicated a specific gravity of 1029.

"*Fourth*--Whether the milk was stirred while cooling, or allowed to rest for a period, sufficient to allow the air mechanically mixed with the milk to escape."

The following table of the specific gravity of milk is also copied from the same report:

Specific Gravity at 60 degrees Fahr.

AUTHORITY.	Maximum.	Minimum.	Average.
Chandler,	1.0348	1.02958	1.03219
Waller,	1.03538	1.02958	1 03219
Newton,	1.034	1.0298	1.0318
Bartley,	1.035	1.030	
Davenport,	1.0326	1.0298	
Babcock,	1.0354	1.0299	
White, J. B.,			1.03149
Mott,	1.040	1.029	1.032
Isham, J. B.,	1.03770	1.03306	1.03183
Jepson and Gardner,	1.0354	1.02958	1.03184
Fleischmann,	1.0343	1.0295	1.0317
Simon,	1.039	1.030	
Hernois Becquerel,	1.03096	1.0302	
Wiggins,			1.032
Hassal,	1.34	1.029	
Group Besanez,		1.029	
Marchand,		1.030	
C. Muller,	1.034	1.029	
Calder,	1.032	1.030	1.0305
Martin,	1.0348	1.029	1.03161
Dechan and Mabin,	1.036	1.028	1.03184

In my own experience I have occasionally found the specific gravity to fall below 1.029. Whether this is in every case due to the fact that the cows were strippers, or that the samples were not properly obtained, I am unable to say. Sometimes samples of milk were brought to me for analysis in glass fruit cans, but in all such cases the persons obtaining the samples were men in whom I have great confidence, and I believe no intentional deception was practiced; nevertheless, it is a very easy matter to obtain, through ignorance or carelessness, an unfair sample, and, in some cases, I have felt quite certain after analysis that the specimen analyzed was not a correct representation of the mixed milk of the animal. As an example of this, I quote an analysis made October 24, 1884:

Evening milk of Jersey cow Charlotte: Fat, 9.88 per cent.; solids not fat, 9.644 per cent.; total solids, 19.32 per cent.; specific gravity, 1024 at 68° Fah.; cream, 36 per cent.

In a list of ninety-six analyses of milk given in the *Analyst* for August, 1885, by Alfred Hill, president of the Society of Public Analysts, the specific gravity ranges from 1.036 to 1.024, and six samples gave a specific gravity below 1.029.

In the *Analyst* for April, 1885, Dr. Veith makes the following statements concerning the specific gravity of milk:

"I wish to repeat here what I have said already on different occasions, viz: that I think the specific gravity a very valuable item for judging a milk. To take the specific gravity as long as the milk is sweet is a very simple thing, in whatever way it is done, whether by means of a specific gravity bottle, or a Sprengel tube, or a suitable hydrometer. Whenever and wherever a milk sample is examined, the specific gravity should be taken. This is, unfortunately, not done, and in some cases which came under my notice, where it had been done, I have reason to believe that not even that very small amount of skill and trouble which is wanted was bestowed upon the determination, and the results obtained were wrong.

"The specific gravity of the mixed milk of several—say, at least, four—cows fluctuates in very narrow limits, and a standard could be fixed much easier than in the case of any of the chemical constituents. The determination of the specific gravity helps to detect the addition of water in the simplest way. Moreover, it has been proved that, basing upon the figures for specific gravity and total solids, the amount of fat can be calculated to a high degree of accuracy, and thus the specific gravity affords the means of simplifying milk analysis or checking the results.

"In my laboratory the specific gravity is taken by means of a hydrometer, specially made for the purpose, and called lactometer, an instrument which, provided its scale is right, shows the specific gravity without any trouble and in the shortest time. The temperature of the milk must be taken into consideration; lactometers show the actual specific gravity at 15° C. A table for correcting the specific gravity according to temperature is appended to this paper. We find the specific gravity to vary from 1.030 to 1.034, with very few exceptions. Very rich Jersey milk, containing about fifteen per cent. of total solids and five per cent. of fat, for instance, has a specific gravity of 1.034 to 1.035. The specific gravity of a mixed milk should never fall below 1.029, unless an excess of cream be present."

I know of a certain creamery where the milk supplied by one man was comdemned because the lactometer was too low and the man informed that he need not supply any more milk. He, however, insisted that he was furnishing a pure, rich milk, and requested a close investigation. This was granted, and it was discovered that this milk, with its low specific gravity, was very rich in fat, and the proprietors of the creamery were satisfied that the mistake was made by them. When such mistakes as these occur, even among those accustomed to handle milk, when they place confidence in the lactometer as indicating an adulteration of the milk, we have reason to consider it as a dangerous instrument as it is now used.

In my opinion, the belief that a milk has been watered merely because the lactometer reading is below 100 is entirely too strongly fixed, and I am convinced that there is much truth in the following words, written by Alfred Wanklyn:

"Although it is so very popular, and although it has been implicitly trusted, the lactometer is a most untrustworthy instrument. There hardly ever was an instrument that has so utterly failed as the lactometer.

"It confounds together milk which is exceptionally rich with milk which has been largely watered; and many a poor French peasant, bringing the best and unadulterated produce of his dairy into a French town, has been ruthlessly stopped by the police, who have dipped their lactometer into the milk and forthwith sent it down the gutter as if it had been milk and water."

Another important instrument for a quick examination of milk is Feser's lactoscope. This instrument is used for determining the per cent. of fat in milk, and is based on the fact that the greater the quantity of fat present the more opaque will be the milk. There are several varieties of lactoscopes, all constructed with a view to determining the relative amount of fat from the opacity of the milk, but of all these I regard Feser's lactoscope as the best.

This instrument is figured in the plates connected with this article. It consists of a hollow glass cylinder, somewhat contracted at the top, in the bottom of which stands a small cylinder of white porcelain, with six black marks upon it (the number of these marks is a matter of no importance). Four cubic centimeters of milk are introduced into the lactoscope, and water added until the black marks on the porcelain cylinder are just barely visible through the diluted milk after the water and milk have been thoroughly mixed. The lactoscope is so graduated that the per cent. of fat can be directly read off from the amount of water added. When one has acquired some skill in reading the lactoscope, the amount of fat present in a sample of milk can be determined to within one fourth of one per cent. The only cautions necessary to be observed in the use of this instrument are in adding exactly the proper amount of milk, and in stopping the addition of water just as soon as the black lines on the porcelain are barely visible.

Heeren's milk tester, or pioscope, is a cheap little instrument, costing only fifty cents. It is easy to use, and gives quite reliable information concerning the quality of the milk.

While the opacity of the milk seems to be a correct guide to its richness in fat, the color of the milk is not a guide, and he who judges a milk to be rich in fat because it has a yellow color is very apt to be deceived. The yellow color of the milk is an indication that the butter yielded will be yellow, and need not be colored artificially. In my experience it indicates nothing as regards the percentage of fat. If the color of the milk is too yellow, and its origin is not positively known, one would naturally be led to imagine that it had been taken from the cow either soon after or soon before calving.

The Cream Test.

Although this test is not always absolutely reliable, still it is sufficiently reliable to give very important indications concerning the composition of milk. I have never found the cream in an unwatered milk to fall below seven per cent., and I have never known it to fall below nine per cent. except in very poor milks.

In my opinion, the mixed milk of a herd of cows ought not to give less than nine per cent. of cream, and a less per cent. than this might excite suspicion that the milk is either naturally very poor or else had been watered. A highly-watered milk may, however, readily yield more than nine per cent. of cream, and a milk may have some cream removed and still contain nine per cent. Cream varies much in its composition; sometimes it is close and compact, and sometimes loose and watery, so that the per cent. of cream cannot be taken as a standard by which to judge the amount of fat. Sometimes a milk containing a very high per cent. of cream will be found to contain less fat than a milk with a smaller per cent. of cream. This fact will be seen by reference to the tables of analyses contained in this paper.

The following experiment shows the effect of water upon the per cent. of cream in one case:

Milk of one cow: Milk unadulterated gave 9 per cent. cream; 9 parts milk with 1 part water gave $7\frac{1}{2}$ per cent. cream; 10 parts milk with 4 parts water gave $6\frac{8}{10}$ per cent. cream.

Having stated a few of the methods of milk analysis and described some of the more important instruments used in the examination of milk, we will now examine the results of the analyses of milk of different breeds of cows.

Results of Analyses of Milk of Friesian Cattle.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
Date,	February, 1884. Morning.	February, 1884. Morning.	April 29, 1884. Evening.	May 2, 1884. Evening.	May 10, 1884.	June 24, 1884. Evening.	July 12, 1884. Evening.	July 30, 1884. Morning.	July 15, 1884. Morning.
Number of cows,	13	1	11	11	Herd.	19	1 Binnema.	1 Binnema.	1 Vogeltje.
Amount of milk,	120 qts. per day.	. . . .	. . . .	160 qts. per day.	. . . .	300 qts. per day.			
Ash,	.64 per cent.	. . . .	.64 per cent.	.65 per cent.	.7 per cent.	. . . .	.64 per cent.	. . . .	.67 per cent.
Lactose,	9.2 per cent.	. . . .	4.21 per cent.	4.218 per cent.	4.3 per cent.	. . . .	8.2 per cent.	. . . .	8.84 per cent.
Casein,		. . . .	3.69 per cent.	3.818 per cent.	4.16 per cent.				
Solids not fat,	9.34 per cent.	10.44 per cent.	8.54 per cent.	8.74 per cent.	9.16 per cent.	8.92 per cent.	8.84 per cent.	9.16 per cent.	9.51 per cent.
Fat,	5.22 per cent.	5.52 per cent.	2.79 per cent.	2.85 per cent.	2.77 per cent.	2.72 per cent.	3.75 per cent.	2.66 per cent.	4.09 per cent.
Total solids,	15.07 per cent.	15.98 per cent.	11.33 per cent.	11.59 per cent.	11.93 per cent.	11.64 per cent.	12.59 per cent.	11.82 per cent.	13.6 per cent.
Water,	84.93 per cent.	84.02 per cent.	88.66 per cent.	88.41 per cent.	88.07 per cent.	. . . .	87.41 per cent.	88.18 per cent.	86.4 per cent.
Specific gravity,	1.029	. . . .	1.0296	1.0281	1.030				
Cream,	22¼ per cent.	18 per cent.	8⅓ per cent.	11½ per cent.	7.53 per cent.	10.3 per cent.	9¼ per cent.	8.97 per cent.	13.8 per cent.
Total solids excreted per day,	.45 lbs. per cow.	. . . .	. . . .	4.3 lbs. per cow.					
Specific gravity corrected for temp.,									
Calculated sp. gr.,	. . . .	. . . .	1.0277	1.02815	1.02976				

Results of Analyses of Milk of Fresian Cattle.—Continued.

	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	
Date,	July 17, 1884. Morning.	December 25, 1884. Evening.	May 5, 1885. Morning.	May 5, 1885. Morning.	May 12, 1885. Morning.	May 18, 1885.	May 28, 1885.	Average comp. of milk.
Number of cows,	1 Edith.	1 Maartje.	Herd.	Herd.	Herd.	. . . .	Herd.	
Amount of milk,	. . . .	9 qts. per day.						
Ash,	.612 per cent.	.70 per cent.	.57 per cent.	.66 per cent.	.72 per cent.	.77 per cent.		
Lactose,	9.108 per cent.	4.49 per cent.	4.38 per cent.	4.68 per cent.	4.3 per cent.	3.55 per cent.		
Casein,		4.299 per cent.	3.72 per cent.	3.84 per cent.	4.97 per cent.	4.47 per cent.		
Solids not fat,	9.72 per cent.	9.489 per cent.	8.77 per cent.	9.18 per cent.	9.99 per cent.	8.79 per cent.	9.89 per cent.	9.32 per cent.
Fat,	3.13 per cent.	2.75 per cent.	3.75 per cent.	3.52 per cent.	3.38 per cent.	3.048 per cent.	3.25 per cent.	3.49 per cent.
Total solids,	12.85 per cent.	12.23 per cent.	12.52 per cent.	12.705 per cent.	13.37 per cent.	11.83 per cent.	13.15 per cent.	12.81 per cent.
Water,	87.15 per cent.	87.76 per cent.	87.48 per cent.	87.29 per cent.	86.63 per cent.	88.16 per cent.	86.85 per cent.	
Specific gravity,	. . . .	. . . .	65 degrees F. 1.030	68 degrees F. 1.029	63 degrees F. 1.0315	68 degrees F. 1.030	68 degrees F. 1.032	
Cream,	12.3 per cent.	9½ per cent.	11 per cent.	11 per cent.	11 per cent.	9 per cent.	13 per cent.	
Total solids excreted per day,	. . . .	2.75 pounds.						
Specific gravity corrected for temp.,	. . . .	. . . .	1.0306	1.0298	1.0318	1.0309	1.0327	
Calculated specific gravity,	. . . .	1.0308	1.0282	1.0295	1.0315	1.02809		

In February the feed was cornmeal, bran, and corn ensilage. At the time of the analyses given in table III and IV, the feed was two quarts cornmeal, with four quarts bran, and cut fodder morning and evening, and a shovelful of mangel-wurtzels and hay at noon. At this time all the cows were strippers.

On May 3, the feed was changed; cornmeal and bran, with hay, being given every other day instead of mangel-wurtzels. This feed was continued until after analysis No. V. When analysis No. VI was made, the feed was pasture and two quarts bran twice a day.

Analyses No. VII and VIII represent the composition of the milk of one cow, named Binnema, born in Friesland, May 25, 1880, imported June 23, 1883. Time of last calving, May 16, 1884. Feed, pasture and three quarts bran twice a day.

Analysis No. IX, milk of cow Vogeltji, born in Winkel, Holland, April 18, 1879; imported June 23, 1883. Time of last calving, February 6, 1884. Feed, same as for Binnema.

Analysis No. X, milk of heifer Edith, born in Holland, March 28, 1882; imported June 23, 1883. Dropped first calf two weeks previous to date of analysis.

Analysis No. XI, milk of cow Maartje, born May, 1880, in Winkel, Holland; imported June 23, 1883.

Analyses Nos. XII and XIII were made from two samples of milk, each taken from a different herd of cows. The feed of the herd from which the sample giving analysis No. XII was taken was four quarts cornmeal, four quarts bran, cut fodder and hay, one half at morn, one half at night, clover-hay at noon.

The feed of the other herd, whose milk gave results indicated in XIII, was four quarts cornmeal, four quarts bran, with cut fodder and hay, one half at morn and the rest at night, ensilage at noon. Analysis XIV represents the milk of the same herd as given in No. XIII. Feed also the same.

The sample taken for analysis No. XV was taken by myself from one forty-quart can which had just been filled. It probably comes very nearly representing the milk of one animal, as I dipped it from the can immediately after the last bucketful had been added, and without much stirring or other agitation. The feed at time of analyses XV and XVI was not taken, or, if taken, the notes have been lost.

About the middle of May, eleven cows were given a daily yield of one hundred and sixty quarts, and from that time for a period of ten weeks or more the yield remained proportionately high, although the absolute amount was increased by the addition of other new milch cows to the herd. In the case of several individual cows the daily yield of milk averaged twenty quarts or more for the period of time above given. It should, perhaps, be stated that the measure here taken as the quart is the dry quart, and by this measure a quart of milk weighs two and one half pounds. (If we take the specific gravity of milk as 1031, one quart weighs 2 pounds 7.94 ounces.) Whereas, by the wine quart, which is frequently used, we have only about two pounds of milk to the quart.

During the period already mentioned, the feed of these was pasture and three quarts of bran twice a day, and the average yield per head upon this feed was fourteen and one half quarts.

In an article on the Dutch-Friesian cattle, written by G. J. Hengerveld, it is stated that cows of this breed producing an annual yield of five thousand or six thousand litres are not at all rare. If we take the larger number and divide by the number of days in the year, we get a daily average of about sixteen and one half litres, or fifteen quarts dry measure for the entire year. This is certainly a very high yield, but it does not seem to me improbable that even this is attained in some cases.

If we take five thousand litres as our basis, we obtain an average daily yield of twelve and one half quarts. I do not know that any careful and complete milk and feed records, extending over a period of one year, have been made upon this breed in America. Such records would be of interest, as it would afford not only a means of comparison of these cows in this country and in Holland, from which we might judge of their relative productiveness in the two countries, but also a basis of comparison with the yield of other breeds of cattle.

The table of the analyses of the milk of this breed, which has already been given, shows considerable variability, both in the composition and amount of milk at different seasons of the year. Of the two analyses made in February, the first shows the composition of the milk of the herd of thirteen cows; the second, of the milk of one cow. At this time the cows were nearly all strippers, and the amount of milk given was only one hundred and twenty quarts per day for the entire thirteen cows, against sixteen quarts in May as the daily yield of eleven cows. This fact probably accounts for the richness of the milk during the month of February, and is another evidence in favor of the opinion generally held that, as a cow yields less milk, there is usually an increase in the per cent. of total solids. In my own experience, I have found the foregoing statement to be almost invariably true. If the decrease in quantity of milk is caused by a decrease in food, or by any improper care of the animal, or any abnormal condition of the organism, one would hardly expect to find an increase in per cent. of solids.

In the early part of April, Edward Brinton, West Chester, Pa., churned the milk of this herd of cows separately, and obtained a yield of one pound of butter out of six and one half quarts of milk.

If an animal shows a decrease in amount of milk, there is also a decrease in the amount of solids secreted. Although the per cent. of solids in the smaller amount of milk yielded is increased, it is not sufficiently increased to counterbalance the decrease in quantity. This fact can be seen by comparing analyses Nos. I and IV in the preceding table of analyses. From the data there given we find that 2.66 quarts of sample No. I furnishes one pound of dry solid matter, and the average total solids for each cow per day is 3.45 pounds.

From analysis No. IV, we find that the milk of May 2 is much poorer in composition, and that 3.46 quarts are required to give one pound of milk solids, but the total amount of dried solids per day for each cow is 4.3 pounds, an increase of nearly one third.

Analyses of the milk of a herd of cows, or of individual animals, which are not accompanied by a statement of the amount of milk yielded, furnish only half of the information necessary to show the value of the animals as butter or cheese producers.

The feed of these cows during February was cornmeal, bran, and ensilage, while during April and the early part of May, they were fed two quarts cornmeal with four quarts bran and cut fodder, morning and evening, mangel-wurtzels and clover hay at noon. Perhaps this change of feed may have influenced both the composition and amount of milk to some extent, but I do not think that this was the principal cause of either the increase in amount or decrease in solids.

Prof. Baumhauer, of Holland, obtained 11.3 per cent. total solids and

8.45 per cent. solids not fat as an average of his one hundred and sixty-two analyses. His examinations were probably made upon the milk of Holland cattle, and possibly upon the milk of animals of this breed.

In a circular edited by the secretary of the Dutch-Friesian Breeders' Association, is the following statement: "The solid matter in the milk of all our native cattle varies from eight to sixteen per cent., the butyraceous or fatty, from two and one half to four and one half per cent.; depending on the various circumstances. Compared with the fat milk of the best foreign cattle, the difference is but slight; and it may be stated that this breed yield the most abundant quantity of a highly butyraceous milk. The average cipher for the quantity of cream is ten to eleven per cent., with which the butyraceous quantity of three to three and one half corresponds.

"Baumhauer's experiments show a difference of cheesy and butyraceous matter of 0.210 to 0.469. From these facts we see that the quantity of butter is such as to allow our best milch cows to vie with any other breed of cattle."

From my own examinations of the milk of this breed, I concluded that it bears a rather close resemblance to the milk of the Devon cattle, and is valuable as an article of food in its natural state. In its composition it approaches human milk more closely than does the milk of our native cattle, and is, therefore, well adapted to the wants of infants and invalids. Unless tainted by the kind of feed, it is a very palatable milk and is well borne by a weak stomach.

If the animals are good butter-producers, it is rather because of the large quantity of milk yielded than of a high percentage of fat.

Below is given a milk record of five Friesian cows. At the time when this record was made, the animals were not receiving any extra supply of feed, nor was there any attempt made by feeding to increase the yield of milk beyond the usual amount:

NAME OF COW.	De Bles.	Binnema	Wadman.	Pietsje.	Vogeltje.	Total for each milking.
July 29, 1884, eve milking, ...	28 lbs.	20 lbs.	20 lbs.	18 lbs.	14 lbs.	90 lbs.
" 30, " morn milking, ...	18½ "	18 "	17½ "	18½ "	13 "	80½ "
Aug. 5, " eve milking, ...	20 "	19 "	20 "	16 "	13½ "	88½ "
" 6, " morn milking, ...	23 "	18 "	19 "	16½ "	12 "	88 "
" 12, " eve milking, ...	27 "	22 "	22 "	17½ "	16 "	104 "
" 13, " morn milking, ...	26 "	20 "	20 "	16 "	14 "	96 "
" 19, " eve milking, ...	26½ "	23 "	19 "	. . . . . .	15 "	83½ "
" 20, " morn milking, ...	28 "	20 "	19½ "	. . . . . .	14½ "	77 "
" 26, " eve milking, ...	26 "	19½ "	17 "	. . . . . .	13 "	75½ "
" 27, " morn milking, ...	28 "	19 "	17½ "	. . . . . .	12 "	71½ "
Average per day, ...	47.2 lbs.	39.7 lbs.	38.3 lbs.	30½ lbs.	27.4 lbs.	

HISTORY.

De Bles—Born in Friesland, Holland, March 16, 1879; dropped last calf May 20, 1884; served, June 14.

Binnema—Born in Friesland, May 25, 1880; dropped last calf May 16, 1884; served, June 26.

Wadman—Born in Friesland, April 1879; calved February, 29, 1884; served, April 24.

Vogeltje—Born in Holland, April 18, 1879; calved February 6, 1884; served, April 21.

Pietsje—Born in Friesland, April 14, 1882; calved March, 1884.

The feed of all was ground corn and oats, mixed with equal volume of bran, of which four quarts, with cut timothy hay, were fed twice a day. At noon cut timothy and bran. Pasture at night.

To save calculations, we may state some of the results in the following form:

De Bles—was five and one half years old; calved about ten weeks previous to record, and was averaging over forty-seven pounds of milk per day.

Binnema—was a little over four years old; calved about four weeks before, and was giving very nearly forty pounds per day.

Wadman—was five and a quarter years old; had dropped last calf five and one half months previous to date, and was averaging over thirty-eight pounds per day.

Pietsje—was two years and three months old; had calved about four months before, and was giving over thirty pounds per day.

Vogeltje—was over five years old; calved about six months before the record was made, and was giving over twenty-seven pounds per day.

	Evening milk of Johanna, September 10, 1885.	Evening milk of Vogeltje, September 10, 1885.	Evening milk of Binnema, September 10, 1885.	Morning milk of Binnema, September 12, 1885.	Morning milk of Vogeltje, September 12, 1885.	Morning milk of Johanna, September 14, 1885.	Morning milk of Dirke, September 22, 1885.
Amount of milk, ...	26 lbs.	10 lbs.	20 lbs.	24.50 lbs.	11.50 lbs.	31 lbs.	14.75 lbs.
Lactose, (per cent.,)..	4.24	3.81	4.70	4.27	3.76	4.32	
Casein, (per cent.,)...	4.38	4.61	4.37	4.63	4.66	4.24	
Ash, (per cent.,)......	.76	.78	.75	.74	.88	.73	
Solids not fat, (per cent.), ...	9.38	9.20	6.83	9.64	9.304	9.29	9.03
Fat, (per cent.,)	3.37	2.09	3.26	2.65	2.25	2.23	2.48
Total solids, (per cent.,)	12.76	11.29	13.09	12.28	11.56	11.506	11.50
Water, (per cent.,)....	87.24	88.71	86.91	87.72	88.44	88.49	
Cream, (per cent.,)...	10	7.5	.10				
Specific gravity,...	66° F. 1.032	70° F. 1.0285	70° F. 1.030	70° F. 1.0295	72° F. 1.027	64° F. 1.029	
Lactoscope test for fat, (per cent.,)	3 25	2.50	3.25	2.75	2.50	2.50	2.25
Total solids excreted,	3.32 lbs.	1.18 lbs.	2.62 lbs.	3 lbs.	1.33 lbs.	3.57 lbs.	
Specific gravity corrected for temperature, ...	1.0328	....	1.0313	....	1.0284	1.0295	

At one morning and one evening's milking, Johanna give 6.89 pounds of solid matter; Binnema, 5.62 pounds of solid matter, and Vogeltje 2.46 pounds. Johanna gave 1.57 pounds of fat, which is equal to about two pounds of butter per day. Binnema, 1.3 pounds of fat, equals 1.6 pounds of butter, and Vogeltje, .46 pounds of fat equals .6 pounds of butter. Dirke gave .75 pounds of fat per day, equals .9 pounds of butter.

In making these calculations, butter has been considered as eighty per cent fat.

The following letter from Mr. Hicks gives the history and feed of three of these animals:

WEST CHESTER, PA., *October 17, 1885.*

PROF. COCHRAN:

Dear Sir:—In relation to the cows you got samples of milk from for analysis, Vogeltje dropped bull calf December 28, 1884, and is due to calve in November again. Binnema dropped bull calf March 31, 1885, and is due in February again. Johanna dropped heifer calf August 7, 1885.

The week you got the milk, the cows were put up to be fed for State fair; they were fed four quarts of corn and oats, ground half and half, morning and evening, with hay all they wanted to eat; at night they were put on pasture.

After you made your analyses and the cows had been fed for a week or two longer, they increased in milk several pounds a day. I am sure the milk was much better later than when you made your test.

Your friend,
JOHN H. HICKS.

Dirke is owned by A. Marshall, and, at date of analysis, was between twenty-one and twenty-two months old; dropped heifer calf about one week previous to date of analysis.

Results of Analyses of Milk of Jersey Cows.

	I.	II.	III.	IV.	V.	VI.
Date,	Mar. 19, 1884. Morning milk.	Mar. 28, 1884.	Mar. 6, 1884.	Dec. 27, 1884.	Oct. 17, 1884.	Oct. 24, 1884.
Number of cows,	1	1	1	1	1	1
Amount of milk, (per cent.,).	....	12 qts.? per day.	18 qts.? per day.	2 qts.? per day.	....	10 qts.? per day.
Ash (per cent.,)	.65	.66	.642	....	.61	.52
Lactose, (per cent.,)	4.34	4.09	4.047			
Casein, (per cent.,)	5.33	5.62	5.11			
Solids not fat, (per cent.,)	10.43	10.37	9.799	10.042	11.08	9.644
Fat, (per cent.,)	7.00	7.50	5.731	5.55	7.88	9.88
Total solids, (per cent.,)	17.32	17.87	15.52	15.59	18.96	
Water, (per cent.,)	82.68	82.13	84.48	....	81.04	
Specific gravity,	1.030	1.0295	1.0292	1.030	1.0295	68° F. 1024
Cream, (per cent.,)	20.50	30	28.6	16	35	36
Total solids excreted,	....	....	....	.78 lbs.	....	4.87 lbs.
Calculated specific gravity,	1.02944	1.02897	1.02866			
Specific gravity corrected for temperature,	....	....	....	....	....	1.0249

The cows furnishing the samples of milk for the above analyses are the property of T. Walter & Sons, residing near West Chester, Pa. My information concerning the amount of milk was obtained from Mr. Edward Walter. The quantity given, so far as I know, was not measured, but was stated to me as a mere matter of judgment, and is, therefore, not to be relied upon. Such statistics are of no value, and to indicate their unreliability, I have put a question mark after each.

Sample No. VI was furnished to me as the milk of one Jersey cow, Charlotte.

That the sample is an unfair one I have no doubt. It is mentioned elsewhere in this article. Sample No. IV is the milk of the same animal. In calculating the average composition of the milk of these animals, analysis No. VI was rejected.

Analysis No. I is the milk of a Jersey heifer born May 17, 1882; dropped first calf February 11, 1884; feed not noted.

Analysis No. II, milk of a cow ten years old; feed, four quarts corncob meal and bran, with cut fodder and hay, twice a day.

Analysis No. III, milk of same animal; feed, four quarts of corncob meal and bran, with a very little cut fodder and hay, twice a day; pasture.

Analysis No. V represents the milk of the same animal as Nos. II and III.

The first five analyses I regard as fair representations of the milk of three Jersey cows. The analyses show a remarkably high per cent. of total solids and of fat. This I believe must be due to the fact that the animals from which the milk was taken were exceptionally good ones.

In the New Jersey State Agricultural Experiment Station report for 1880, Prof. George H. Cook reports the average composition of the milk of six Jersey cows as found from the results of analyses made upon thirteen consecutive days, beginning November 24 and ending December 6. The herd of Jerseys chosen for this experiment belonged to William S. Taylor of Burlington.

"In order to verify the results of the milk trial, Mr. Taylor's Jersey's trials of a single day each were made with six cows; from Hon. H. C. Kelsey's herd of Jerseys in Newton, Sussex county, and also the same number from Hon. Thomas H. Dudley's herd of Jerseys at Camden. The results were altogether satisfactorily, as the following figures show:

	Specific gravity.	Water.	T. S.	Fat.	Casein.	Sugar.	Ash.
Mr. Taylor's herd (average),...	1.0335	85.28	14.72	5.21	3.67	4.93	0.91
Mr. Kelsey's herd (one day),..	1.0346	85.49	14.51	5.19	3.51	4.82	0.99
Mr. Dudley's herd (one day),..	1.0346	85.12	14.88	5.20	3.97	4.73	0.98

The general results of the thirteen days' experiments upon six cows from Mr. Taylor's herd of Jerseys, and also upon a herd of six native cows and five Ayrshires, are here inserted.

The results show that each Jersey cow gives about one tenth of a pound of butter per day more than each native cow, and about one fifth of a pound more than each Ayrshire; but it is stated that one of the Ayrshire cows was too old and another too young to be considered as average cows.

General Results of Thirteen Days' Experiments.

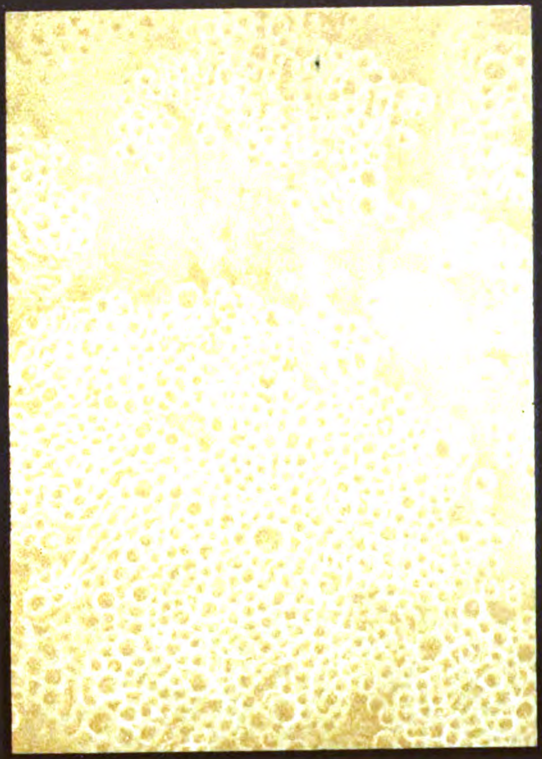
<table>
<tr><th></th><th colspan="6">Herd of six Jersey cows.</th><th colspan="6">Herd of six Native cows.</th><th colspan="5">Herd of five Ayrshire cows.</th></tr>
<tr><td>Total yield of milk per herd,</td><td colspan="6">1,653 lbs. 8 oz.</td><td colspan="6">1,759 lbs. 4 oz.</td><td colspan="5">1,421 lbs. 4 oz.</td></tr>
<tr><td>Total average yield of milk per cow,</td><td colspan="6">275 lbs.</td><td colspan="6">293 lbs.</td><td colspan="5">284 lbs.</td></tr>
<tr><td>Total amount of butter from each cow,</td><td>13.54</td><td>13.36</td><td>15.15</td><td>13.24</td><td>20.00</td><td>17.62</td><td>12.90</td><td>15.10</td><td>16.17</td><td>16.84</td><td>10.42</td><td>15.37</td><td>12.76</td><td>16.36</td><td>10.46</td><td>15.43</td><td>11.47</td></tr>
<tr><td>Total amount of butter from herd,</td><td colspan="6">94.7 lbs.</td><td colspan="6">86.82 lbs.</td><td colspan="5">67.68 lbs.</td></tr>
<tr><td>Total average yield of butter per cow,</td><td colspan="6">15.8 lbs.</td><td colspan="6">14.5 lbs.</td><td colspan="5">13.5 lbs.</td></tr>
<tr><td>Daily average yield of butter per cow,</td><td colspan="6">1.21 lbs.</td><td colspan="6">1.11 lbs.</td><td colspan="5">1.03 lbs.</td></tr>
<tr><td>Food per 1,000 lbs., live weight, consumed during period,</td><td colspan="2">Protein.
32.5 lbs.</td><td colspan="2">Fat.
5.2 lbs.</td><td colspan="2">Carbhydrates.
162.5 lbs.</td><td colspan="2">Protein.
32.5 lbs.</td><td colspan="2">Fat.
5.2 lbs.</td><td colspan="2">Carbhydrates.
162.5 lbs.</td><td colspan="2">Protein.
32.5 lbs.</td><td>Fat.
5.2 lbs.</td><td colspan="2">Carbhydrates.
162.5 lbs.</td></tr>
<tr><td>Gain in weight per 1,000 lbs.,</td><td colspan="6">49.4 lbs.</td><td colspan="6">58.8 lbs.</td><td colspan="5">30 lbs.</td></tr>
<tr><td>Yield of milk per 1,000 lbs.,</td><td colspan="6">312 lbs.</td><td colspan="6">303 lbs.</td><td colspan="5">319 lbs.</td></tr>
<tr><td>Yield of butter per 1,000 lbs.,</td><td colspan="6">17.88 lbs.</td><td colspan="6">14.92 lbs.</td><td colspan="5">15.06 lbs.</td></tr>
</table>

In this table, an increase of ten per cent. is made upon the pure fat, so as to give the amount of marketable butter the milk will yield. The fat in butter varies from ninety-nine to sixty-one per cent.

Results of Analyses of Milk of Guernsey Cattle.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
Date,	March 19, 1884. Morning.	May 17, 1884. Evening.	December 27, 1884. Evening.	October 24, 1884. Evening.	December 22, 1884. Morning.	December 22, 1884. Morning.	December 30, 1884. Morning.	December 30, 1884. Morning.	December 30, 1884. Morning.	December 30, 1884. Morning.
Number of cows,	1 Rosetta II.	1 Rosetta III.	1 Rosetta III.	1 Rosetta II.	1 Lizzie.	1 Monoca.	1 Rougetta.	1 Sprightly.	1 Jessie.	1 ....
Amount of milk,	4 quarts per day.	....	2 quarts per day.	....	5 quarts per day.	9½ qts. per day.	....	....	....	Morning milk, 7 lbs. 8 oz.
Ash, per cent.,	.67	.655	....	.657	.76	.68	.72	....	.803	....
Lactose, per cent.,	4.48	4.155	4.18	....	4.70	4.76	4.39	....	4.11	
Caseine, per cent.,	5.25	4	....	....	5.545	4.71	4.20	....	4.693	
Solids not fat, per cent.,	10.35	8.81	10.03	10.799	11.005	10.15	9.307	....	9.606	9.71
Fat, per cent.,	7.6	5.52	7.12	5.96	5.008	5.05	4.533	....	4.23	5.58
Total solids, per cent.,	17.95	14.33	17.15	16.759	16.008	15.2	13.84	17.187	13.836	15.29
Water, per cent.,	82.05	85.67	82.85	83.24	83.99	84.8	86.16	82.86	86.164	84.71
Specific gravity,	1.029	1.027	53 degrees F. 1.029	at 58 degs. F. 1.032	64 degrees F. 1.034	65 degrees F. 1.031	66 degrees F. 1.029	66 degrees F. 1.031	66 degrees F. 1.033	....
Cream, per cent.,	18	13	16	16	12	12.5	9	18	10	20
Total solids excreted per day,	1.795 lbs.	....	.428 lbs.	....	2.001 lbs.	3.42 lbs.	....	....	2.023 lbs.	....
Weight of cow,	....	....	....	....	950 lbs.	950 lbs.	....	....	....	
Specific gravity corrected for temperature,	....	....	1.0284 1.0283	1.0317	1.0344	1.0315	1.02958	1.0315	1.0335	....
Calculated specific gravity,	1.029	1.0265	....	....	1.0335	1.03106	1.02906	....	1.03013	

SKIMMED MILK OF OUR GUERNSEY COW,
BY 540 DIAMETER.



CREAM FROM MILK OF OUR GUERNSEY COW,
BY 540 DIAMETER.

Results of Analyses of Milk of Guernsey Cattle—Continued.

	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	
Date,	December 30, 1884. Morning.	January 21, 1885. Morning.	January 21, 1885.	July 13, 1885. Morning.	July 13, 1885. Morning.	July 14, 1885. Morning.	July 14, 1885. Morning.	- Morning.	Average comp. of milk.
Number of cows,	1	1 Monoca.	Lizzie.	1 Beckie.	10	1 Beauty.	6	1 Worthy Beauty.	
Amount of milk,				11 quarts per day.	one milking, 33½ quarts.	10½ quarts per day.			
Ash, per cent.,	.80								
Lactose, per cent,									
Caseine, per cent.,									
Solids not fat, per cent.,	9.7	9.55	10.74	8.82	9.79	9.85	9.45	9.19	9.815
Fat, per cent.,	6.55	4.89	5.62	5.91	5.59	4.85	3.95	3.9	5.403
Total solids, per cent.,	16.25	14.66	16.38	14.736	15.38	14.707	13.41	13.09	15.34
Water, per cent.,	83.75	85.34	83.62	85.264	84.62	85.293	86.59	86.91	84.66
Specific gravity,	57 degrees F. 1.031			74 degrees F. 1.027	74 degrees F. 1.030		70 degrees F. 1.030	70 degrees F. 1.029	
Cream, per cent.,	17.5	12		15.5	14				
Total solids excreted per day,				4.052 lbs.	26.76 lbs.	3.52 lbs.			
Weight of cow,									
Specific gravity corrected for temperature,	1.0307			1.0287	1.0316		1.031	1.0299	
Calculated specific gravity,									

Analysis No. I, of March 19, represents the composition of the morning milk of one Guernsey cow with fourteen months calf. The cow was about six years old. (Born April 11, 1878.)

Rosetta III was born December 8, 1881; dropped heifer calf April 5, 1884; served April 26, 1884.

On May 17, 1884, the date of analysis No. II, her feed was four quarts corncob meal and bran twice a day, with about one half bushel of green rye and hay at each feed. The feed on December 27, analysis No. III, not known.

Analysis No. V represents the composition of milk of cow Lizzie, owned by A. Scott; dropped calf five and one half months previous to date.

The cow Monoca, from which the next sample was taken, calved four weeks previous to date of analysis. The milk was taken from each of these two cows at eleven, A. M., and was the mixed milk of two teats, one hind and one front; the cows had been milked at five, A. M. The feed of each cow was four quarts cornmeal, eight quarts bran, one pint cotton-seed meal, with hay, corn fodder, and wheat chaff, all mixed together. In addition to the above feed, each animal received some timothy hay twice a day. Weight of each cow, nine hundred and fifty pounds.

Samples VII, VIII, and IX were from the milk of three cows named in the table, owned by Thomas M. Harvey of West Grove, Chester county, Pennsylvania. No data concerning the history or feed of the animals was given me. The cows furnishing samples No. X and No. XI are the property of Henry Palmer of West Grove; the one from which sample No. X was taken dropped last calf May 31, 1884, and was last served August 2. 1884.

On January 21, the milk of the two Guernseys, Monoca and Lizzie, owned by A. Scott, was again analyzed. The feed was the same as on December 22, except this time the cows had clover hay instead of timothy.

The history and feed of Beckie, whose milk was analyzed on July 13, is as follows: Age, five years; calved four months previous to date; feed, eight quarts bran, with pasture; property of A. Scott.

The ten cows furnishing the milk of the next analysis were also owned by A. Scott. The feed of each cow was eight quarts bran per day, with pasture.

The next analysis is also of the milk of a cow three years old, with first calf, owned by A. Scott; feed, eight quarts bran per day, with pasture. The cows furnishing milk for analyses XVII and XVIII were owned by Thomas M. Harvey. The following letter gives a complete description of condition of animals, mode of obtaining samples, feed, &c.

Milk (Thoroughbred Guernsey).

(Sent to Prof. C. B. Cochran, West Chester Normal School, July 14, 1885, by Thomas M. Harvey & Son.)

Following conditions:—Cows on dry pasture—plenty of flies—and in addition, most of the cows have about two quarts of wheat-bran each, morning and evening. We report the whole milk for each cow for twenty-four hours; samples taken from morning's milking.

The whole milk—eight pounds—was taken from Worthy Beauty, and then poured six times back and forth from one bucket to another, then a pint of the milk dipped out. Immediately, a three-ounce vial, filled without stirring, to use in photographing (in case the stirring spoiled the other samples for that use), and this vial was at once put in ice-water. The balance of the pint was then stirred twenty minutes, vessel setting in ice-water; at the expiration of that time, a four-ounce vial was filled from it and corked up for analysis.

After this, six other cows of different ages and conditions were milked, each weighed separately, and then thrown into one vessel, and after this from one to another vessel six times, until thoroughly mixed; then a pint dipped out and stirred twenty minutes in ice-water, as the other sample; and then a four-ounce vial filled, corked, and sent off.

Condition of cows, as follows:

Name of cows.	Age of each.	When last fresh.	When served.	Weight of milk in 24 hours.
Worthy Beauty,	17 4–12 yrs.	February 5, 1885.	June 1, 1885.	16 lbs.
Leora,	4 5–12 “	June 6, 1885.	....	22 “
Clover,	6 2–12 “	June 20, 1885.	....	23 “
Mignonette,	9 “	June 11, 1885.	....	18 “
Topsy,	6 “	Nov. 20, 1884.	Jan. 20, 1885.	13 “
Gracie,	13 3–12 “	August 18, 1884.	April 28. 1885.	17 “
Herma,	6 2–12 “	May 17, 1885.	July 8, 1885.	19 “

The following are three analyses of the milk of Devon cows, property of Dr. Cheston Morris:

Date,	March 26, 1884.	May 3, 1884.	July 16, 1884.
Number of cows,	9	9	1
Ash,	0.69 per cent.	0.685 per cent.	0.623 per cent.
Lactose,	4.6 “ “	4.3 “ “	
Casein,	3.41 “ “	3.915 “ “	
Solids not fat,	8.70 “ “	8.9 “ “	9.99 “ “
Fat,	3.75 “ “	2.82 “ “	3.31 “ “
Total solids,	12.45 “ “	11.72 “ “	13.3 “ “
Water,	87.55 “ “	88.28 “ “	86.7 “ “
Specific gravity,	1.0287	1.0288 “ “	1.032 “ “
Cream,	9.6 per cent.	8.6 “ “	12⅓ “ “
Calculated specific gravity,	1.02827	1.0288 “ “	

On March 26, the feed was cornmeal, hay, and cut fodder twice a day, one bushel of potatoes once a day.

On May 3, the feed was two quarts corn-cob meal and hay twice a day, for each cow, two bushels of potatoes daily, for the nine cows on grass for a week.

The following tables represent the average composition of the milk of three breeds of cows as accurately as it can be obtained from the data furnished by my analysis.

In the case of the Devon milk, I have taken only the average of the two analyses of the milk of the nine cows, and in the case of the Friesian and Guernseys only the average of the analyses of the mixed milk of several animals.

The table showing the composition of Jersey milk is given in another part of this article, and is on the authority of Prof. Cook. As my own analyses were made on individual cows, I do not regard the results as indicative of the average composition of the milk of Jersey cattle.

Table Giving Average Composition of Milk of Different Breeds.

	Devon.		Friesian.		Guernsey.		Jersey.	
Solids not fat, .	8.8	per cent.	9.28	per cent.	9.62	per cent.	9.51	per cent.
Fat, ...	3.785	" "	3.33	" "	4.72	" "	5.21	" "
Total solids, ..	12.085	" "	12.48	" "	14.36	" "	14.72	" "
Water, ...	87.915	" "	87.40	" "	85.64	" "	85.28	" "
Specific grav.,	1.02875	" "	1.0299	" "	1.030	" "	1.0335	" "
Cream, ...	9.1	" "	11.50	" "	14	" "		

Taking the average amount of butter per day given by the Jersey cows, from the results of Prof. Cook, and figuring on exactly the same basis for the Friesians and Guernseys from the results of my own analyses, we have the following as the average daily quantity of butter per head for each breed:

Friesian, ...	1.22 lbs.
Jerseys, ...	1.21 "
Guernseys, ...	.96 "

To positively settle the question of the relative value of the different breeds as butter producers, it is necessary that large herds of each breed be kept under as nearly the same condition as possible, and that the butter record of each herd be kept for a period of not less than one year. In addition to this, a record of food consumed and milk yielded by each herd could be kept with little additional trouble. A few investigations of this kind would settle many interesting questions.

With regard to the effect of food upon character and quantity of milk, I feel unable to make any positive assertions from the results of my own experiments.

It will be noticed, by reference to the tables of analyses of milk of Friesian* and Guernsey cows, that the feed has varied considerably at times of different analyses. In the case of Guernseys, for example, clover-hay has been substituted for timothy; and in the case of Friesians, sometimes ensilage has been used, and sometimes corn fodder.

From experiments made at the New Jersey State agricultural station, it is concluded that the milk yield from corn ensilage is no greater than that obtained from feeding dried fodder corn, provided other conditions remain the same and equivalent amounts of these foods be used. In a most excellent article on "A Rational System of Stock Feeding," given on page forty-eight of the same report of 1880, of the same station, it is stated that two and one half pounds of digestible nitrogenous or protein food, four tenths pounds of fat, and twelve and one half pounds of digestible starchy matter are a sufficient amount of food per day for an ordinary milch cow of one thousand pounds' weight. This amount should be contained in about twenty-five pounds of dried food.

As the percentage of the above-named ingredients in the various fodders and foods are known, with more or less certainty, we have at hand the knowledge necessary for an intelligent and economical mixing of feeds, both as regards kind and amount.

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*I use the term Friesian and not Holstein-Friesian, because my experiments have been made upon purely Friesian cows. All the animals were recorded in the Friesian Herd-Book before the consolidation of the two associations, and the assumption of the mongrel name Holstein-Friesian.

Our knowledge upon this subject, however, is not yet as certain as is to be desired, inasmuch as the composition of crops depend, to some extent, upon the soil and climate in which they are grown. Furthermore, individual peculiarities are frequently of necessary consideration, the feed must be adapted to the tastes and digestive powers of the animal:

Again, all animals are not alike in their requirements of food; some, doubtless, need more than others, and under different conditions the same animal may require different quantities of food. An animal poorly protected from the cold requires more food than when well protected, or, if she is giving an unusually large amount of milk, or an average amount very rich in milk solids, an increased quantity of feed is needed to maintain the normal weight and a perfect condition of health.

What will be the effect upon the milk of an excess of digestible, fatty, nitrogenous, or starchy aliments over what has been quoted is an interesting question, both from a practical and theoretical stand-point. This question asks for the origin of the various solid constituents of milk, and involves, in part at least, the history of the various alimentary principles within the animal organism and the functions they there subserve, and, although a very old physiological question, some of the known facts are of sufficient interest and importance to bear repetition.

Since the fat in the milk is far greater than the fat in the food, it is evident that fat is formed in the organism from something which is not fat. Whether the fat of milk is supplied by the starches and sugars or by the proteids has, in the past, furnished a matter of investigation and discussion to physiologists and chemists. The arguments on both sides of this question form an interesting chapter in the history of physiological science.

That the fat of milk is formed by a sort of natural fatty degeneration of the contents of the gland cells seems now to be a settled conclusion, and, such being the case, the immediate antecedent of the milk-fat is the cell protoplasm, which is a nitrogenous substance. The description of the formation of the solid organic constituents of milk, as given in Foster's physiology, page 443, is so instructive and concise that I insert it here:

"Milk, like the other secretions which we have studied, is the result of the activity of certain protoplasmic secreting cells, forming the epithelium of the mammary glands. As far as the fat is concerned, the processes taking place in the gland are very instructive, since the fat can be *seen* to be gathered in the epithelium cell in the same way as in a fat cell of the adipose tissue, and to be discharged into the channels of the gland, either by a breaking up of the cells or by a contractile extrusion very similar to that which takes place when an amœba ejects its digested food. All the evidence we possess goes to prove that the fat is formed in the cell through a metabolism of the protoplasm."

The microscopic history is thoroughly supported by other facts. Thus, the quantity of fat present in milk is largely and directly increased by proteid, but not increased, on the contrary diminished, by fatty food.

This is quite intelligible when we know, as will be seen in a succeeding section, that proteid food increases and fatty food diminishes the metabolism of the body.

A bitch fed on meat for a given period gave off more fat in her milk than she could possibly have taken in her food, and that, too, while she was gaining in weight; so that she could not have supplied the mammary gland with fat at the expense of fat previously existing in her own body.

In the ripening of cheese, we have a similar conversion of proteids into fat. We have also evidence that the casein is, like the fat, formed in the gland itself.

When milk is kept at thirty-five degrees C. (ninety-five degrees F.) out of the body the casein is increased at the expense of the albumen. When the action of the cell is imperfect, as at the beginning or end of lactation, the albumen is in excess of the casein; but as long as the cell possesses its proper activity, the formation of casein becomes prominent. That the milk sugar also is formed in and by the protoplasm of the cell is indicated by the fact that the sugar is not dependent on carbohydrate food, and is maintained in abundance in the milk of carnivora when these are fed exclusively on meat as free as possible from any kind of sugar or glycogen. We thus have evidence in the mammary gland of the formation, by the direct metabolic activity of the secreting cell, of the representatives of the three great classes of food stuffs: proteids, fats, and carbohydrates, out of the comprehensive substance, protoplasm.

Standard Composition of Milk.

For purposes of comparison, the adoption of a standard of the average composition of milk is a matter of convenience, and, for the purpose of the detection of adulteration, a necessity.

The following is given by S. P. Sharpless of Boston, as a standard below which pure milk ought not to fall. Specific gravity, 1.030; sugar, 4.4 per cent.; casein, 4.3 per cent.; ash, .6 per cent.; fat, 3.2 per cent.; total solids, 12.5 per cent.; cream, ·8 per cent.

A quart of such milk as this weighs 2 pounds 7.94 ounces, at 60 degrees Fahr. (which is practically two and one half pounds per quart.) Every forty quarts of this milk contain twelve and one half pounds of solid matter, and about four pounds of butter.

The Society of Public Analysts of England have adopted the following standard as the lowest limit for pure milk: fat, two and one half per cent.; solids not fat, nine per cent.

Prof. E. W. Martin, in a recent report on milk, makes this statement: "If, then, we assume that in healthy normal cows' milk there should be not more than 87.5 per cent of water, 3.2 per cent of fat, 9.3 per cent of solids not fat, and 12.5 per cent. of total solids, we are well within the limits."

In a series of sixteen analyses of the milk from herds in various sections of the State of New York, made by Prof. Martin, the poorest sample gave the following results: Total solids, 12.53 per cent; solids not fat, 9.24 per cent.; fat, 3.29 per cent.; and the richest gave, total solids, 17.9 per cent.; solids not fat, 9. 59 per cent.; fat, 8.31 per cent. This sample is the mixed milk of twenty cows. In the report of the analysis of this milk, the specific gravity is not given.

Dechan and Maben make the following statement: That, in the case of mixed dairy milks, the limit should not be lower than that at present adopted by the society, viz: Fat, 2.5 per cent. and solids not fat, 9.0 per cent.; or their equivalent, as calculated by some such method as suggested by Mr. Estcourt.

That, in the case of single cows, the limit might be lowered to fat, 2.5, and solids not fat, 8.5, or their equivalent. The fixing of two limits would, of course, require it to be stated when the milk is sent for analysis whether it is from a single cow or from the mixed milk of a dairy.

In my opinion, the statement of Dechan and Maben is correct. If, in the case of a herd of cows, we find the fat sinking below two and one half per cent., and solids not fat, below nine per cent., there can be little doubt that the milk is watered; but if the fat is above two and one half per cent., the solids not fat may fall below nine per cent. without indicating a watered milk. During the months of May and June, when the cattle are on fresh young pasture, and the flow of milk is very abundant, we find the composition of the milk is poorest, and the analyst need not be surprised at meeting with low results at this season of the year.

To fix upon a standard of composition of milk that shall be low enough to include the milk of all breeds of cows at all seasons of the year, and high enough to prevent any adulteration, is a very difficult task.

The standard suggested by Prof. E. W. Martin and Prof. S. P. Sharpless of 3.2 per cent. for fat, and 9.3 per cent. for solids not fat is, according to the results of my analyses, too high. Even the standard of nine per cent., adopted by the Society of Public Analysts, is evidently too high to include the milk of all animals at all seasons, and under all healthy conditions.

The following table includes the results of some investigations made for the purpose of discovering the difference between the composition of milk and skimmed milk from cows of different breeds. It has been said that the skimmed milk of Guernsey cows is richer in fat than the skimmed milk of other breeds. The results given in the table, as far as they go, show for themselves.

In order to skim the milk in the same manner and insure exact similarity of conditions, the milk to be examined is set in the tubes shown in the accompanying plate. The tubes are about one and one half inches internal diameter and about twenty-four inches long, provided with rubber tube and stop-cock below. Milk is set in these tubes to the height of six inches, and, after standing twenty-four hours in a cool place, the milk is drawn off from under the cream until the cream sinks to the contraction of the tube.

Microscopic examination reveals the fact that the smaller fat globules, as a rule, remain in the skimmed milk, while the larger ones rise in the cream.

These small fat globules, perhaps, differ in their composition from the larger ones in the cream, since butter made from a second skimming is said to be much inferior to that made from the first.

Results of Analyses of Milk and Skim-Milk from Cows of Different Breeds.

	I.		II.		III.		IV.		V.	
Date,	December 22, 1884.		December 24, 1884.		December 27, 1884.		December 27, 1884.		December 31, 1884.	
Number of cows, Breed,	1 Guernsey.		1 Friesian.		1 Jersey.		1 Guernsey.		1 Guernsey.	
	Milk.	Skim-milk.	Milk.	Skim-milk.	Milk.	Skim-milk.	Milk.	Skim-milk.	Milk.	Skim-milk.
Fat, per cent.,	5.008	1.878	2.72	.38	5.55	.88	7.12	1.15	5.58	.29
Solids not fat, per cent.,	11.005	12.587	12.519	9.938	10.042	10.97	10.08	11.45	9.71	10.93
Total solids, per cent.,	16.008	13.96	12.239	10.318	15.592	11.852	17.15	12.6	15.29	11.223
Specific gravity,	64 degrees F. 1.034	55 degrees F. 1.039	64 degrees F. 1.028	52 degrees F. 1.033	53 degrees F. 1.030	57 degrees F. 1.034	53 degrees F. 1.029	63 degrees F. 1.035	66 degrees F. 1.028	60 degrees F. 1.0345
Cream, per cent.,	12½	....	9½.	....	16	....	16	....	20	....
Specific gravity corrected for temperature,	1.0846	....	....	1.032	1.0292	1.0381	1.0283	1.0356	1.0287	1.0345

Results of Analyses of Milk from Cows of Different Breeds—Continued.

	VI.		VII.		VIII.		IX.	
Date,	May 5, 1885.		May 18, 1885.		May 28, 1885.		June 17, 1885.	
Number of cows, Breed,	Herd. Friesian.		Herd. Friesian.		Herd. Friesian.		1 Grade Jersey.	
	Milk.	Skim-milk.	Milk.	Skim-milk.	Milk.	Skim-milk.	Milk.	Skim-milk.
Fat, per cent.,	3.52	.497	3.048	.75	3.25	1.037	4.66	1.51
Solids not fat, per cent.,	9.18	9.513	8.79	8.958	9.891	10.263	10.74	10.245
Total solids, per cent.,	12.705	10.01	11.837	9.508	13.15	11.30	15.4	11.765
Specific gravity,			1.030		68 degrees F. 1.032		24 degrees C. 1.030	
Cream, per cent.,			9		13		13½	
Specific gravity corrected for temperature,					1.0332			

For the purposes of dairy or creamery men, the following method of examining milk might be adopted, and all but the method of determining total solids I can recommend:

First—Determine specific gravity by lactometer, or a suitable hydrometer, at a known temperature.

Second—Determine fat by use of Feser's lactoscope.

Third—Set aside a portion of the milk in a suitable vessel, and, after twenty-four hours, read per cent. of cream.

Fourth—If the temperature at which the specific gravity was determined was not 60° Fahr., then correct for that temperature.

If this work has been done with care, we have the data from which to determine total solids by the use of Dr. Veith's formulæ:

I. $t = a \times 1.173 + 2.71\left(100 - \frac{100}{s}\right)$.
II. $a = t \times .852 - 2.31\left(100 - \frac{100}{s}\right)$.
t = percentage of total solids.
a = percentage of fat.
s = specific gravity (water = 1).

If a lactometer be used for this work, then the specific gravity must be found from tables giving the specific gravity corresponding to each degree of the lactometer.

A table of this kind is here inserted, with the hope that it may be found a matter of convenience to some.

LACTOMETER.	Gravity.	LACTOMETER.	Gravity.	LACTOMETER.	Gravity.
0	1.00000	41	1.01189	82	1.02378
1	1.00029	42	1.01218	83	1.02407
2	1.00058	43	1.01247	84	1.02436
3	1.00087	44	1.01276	85	1.02465
4	1.00116	45	1.01305	86	1.02494
5	1.00145	46	1.01334	87	1.02523
6	1.00174	47	1.01363	88	1.02552
7	1.00203	48	1.01392	89	1.02581
8	1.00232	49	1.01421	90	1.02619
9	1.00261	50	1.01450	91	1.02630
10	1.00290	51	1.01479	92	1.02668
11	1.00319	52	1.01508	93	1.02697
12	1.00348	53	1.01537	94	1.02726
13	1.00377	54	1.01566	95	1.02755
14	1.00406	55	1.01595	96	1.02784
15	1.00435	56	1.01624	97	1.02813
16	1 00464	57	1.01653	98	1.02842
17	1.00493	58	1.01682	99	1.02871
18	1.00522	59	1.01711	100	1.02900
19	1.00551	60	1.01740	101	1.02929
20	1.00580	61	1.01769	102	1.02958
21	1.00609	62	1.01798	103	1.02987
22	1.00638	63	1.01827	104	1.03016
23	1.00667	64	1.01856	105	1.03045
24	1.00696	65	1.01885	106	1.03074
25	1.00725	66	1.01914	107	1.03103
26	1.00754	67	1.01943	108	1.03132
27	1.00783	68	1.01972	109	1.03161
28	1.00812	69	1.02001	110	1.03190
29	1.00841	70	1.02030	111	1.03219
30	1.00870	71	1.02059	112	1.03248
31	1.00899	72	1.02088	113	1.03277
32	1.00928	73	1.02117	114	1.03306
33	1.00957	74	1.02146	115	1.03335
34	1.00986	75	1.02175	116	1.03364
35	1.01015	76	1.02204	117	1.03392
36	1.01044	77	1.02233	118	1.03422
37	1.01073	78	1.02262	119	1.03451
38	1.01102	79	1.02291	120	1.03480
39	1.01131	80	1.02320		
40	1.01160	81	1.02349		

Table for Correcting the Specific Gravity of Milk According to Temperature.

By Dr. P. VIETH, F. C. S., &c.

Degrees of Lactometer.	DEGREES OF THERMOMETER, (FAHRENHEIT.)																															Degrees of Lactometer.
	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	**60**	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	
20	19.0	19.0	19.1	19.1	19.2	19.2	19.3	19.4	19.4	19.5	19.6	19.7	19.8	19.9	19.9	**20.0**	20.1	20.2	20.2	20.3	20.4	20.5	20.6	20.7	20.9	21.0	21.1	21.2	21.3	21.5	21.6	 20
21	19.9	20.0	20.0	20.1	20.2	20.2	20.3	20.3	20.4	20.5	20.6	20.7	20.8	20.9	20.9	**21.0**	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	22.0	22.1	22.2	22.3	22.4	22.5	22.6	 21
22	20.9	21.0	21.0	21.1	21.2	21.2	21.3	21.3	21.4	21.5	21.6	21.7	21.8	21.9	21.9	**22.0**	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	23.0	23.1	23.2	23.3	23.4	23.5	23.7	 22
23	21.9	22.0	22.0	22.1	22.2	22.2	22.3	22.3	22.4	22.5	22.6	22.7	22.8	22.8	22.9	**23.0**	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	24.0	24.1	24.2	24.3	24.4	24.6	24.7	 23
24	22.9	22.9	23.0	23.1	23.2	23.2	23.3	23.3	23.4	23.5	23.6	23.6	23.7	23.8	23.9	**24.0**	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.9	25.0	25.1	25.2	25.3	25.5	25.6	25.7	 24
25	23.8	23.9	24.0	24.0	24.1	24.1	24.2	24.3	24.4	24.5	24.6	24.6	24.7	24.8	24.9	**25.0**	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.9	26.0	26.1	26.2	26.4	26.5	26.6	26.8	 25
26	24.8	24.9	24.9	25.0	25.1	25.1	25.2	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	**26.0**	26.1	26.2	26.3	26.5	26.6	26.7	26.8	27.0	27.1	27.2	27.3	27.4	27.5	27.7	27.8	 26
27	25.8	25.9	25.9	26.0	26.1	26.1	26.2	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	**27.0**	27.1	27.3	27.4	27.5	27.6	27.7	27.8	28.0	28.1	28.2	28.3	28.4	28.6	28.7	28.9	 27
28	26.7	26.8	26.8	26.9	27.0	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	**28.0**	28.1	28.3	28.4	28.5	28.6	28.7	28.8	29.0	29.1	29.2	29.4	29.5	29.7	29.8	29.9	 28
29	27.7	27.8	27.8	27.9	28.0	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	**29.0**	29.1	29.3	29.4	29.5	29.6	29.8	29.9	30.1	30.2	30.3	30.4	30.5	30.7	30.9	31.0	 29
30	28.6	28.7	28.7	28.8	28.9	29.0	29.1	29.1	29.2	29.3	29.4	29.6	29.7	29.8	29.9	**30.0**	30.1	30.3	30.4	30.5	30.7	30.8	30.9	31.1	31.2	31.3	31.5	31.6	31.8	31.9	32.1	 30
31	29.5	29.6	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.8	30.9	**31.0**	31.2	31.3	31.4	31.5	31.7	31.8	32.0	32.2	32.2	32.4	32.5	32.6	32.8	33.0	33.1	 31
32	30.4	30.5	30.5	30.6	30.7	30.9	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.9	**32.0**	32.2	32.3	32.5	32.6	32.7	32.9	33.0	33.2	33.3	33.4	33.6	33.7	33.9	34.0	34.2	 32
33	31.3	31.4	31.4	31.5	31.6	31.8	31.9	32.0	32.1	32.3	32.4	32.5	32.6	32.7	32.9	**33.0**	33.2	33.3	33.5	33.6	33.8	33.9	34.0	34.2	34.3	34.5	34.6	34.7	34.9	35.1	35.2	 33
34	32.2	32.3	32.3	32.4	32.5	32.7	32.9	33.0	33.1	33.2	33.3	33.5	33.6	33.7	33.9	**34.0**	34.2	34.3	34.5	34.6	34.8	34.9	35.0	35.2	35.3	35.5	35.6	35.8	36.0	36.1	36.3	 34
35	33.0	33.1	33.2	33.4	33.5	33.6	33.8	33.9	34.0	34.2	34.3	34.5	34.6	34.7	34.9	**35.0**	35.2	35.3	35.5	35.6	35.8	35.9	36.1	36.2	36.4	36.5	36.7	36.8	37.0	37.2	37.3	 35

DIRECTIONS FOR USE.—Find the temperature of the milk in the uppermost horizontal line, and the specific gravity in the first or last vertical column. In the same line with the latter, under the temperature, is given the corrected specific gravity.

A series of analyses made by myself upon one grade Guernsey cow, property of A. Sharpless, reveals the fact that the composition of cows' milk varies from day to day. These analyses were given in the report of the State Agricultural Society for 1884. The milk record of Friesian cattle given in this report shows that the amount of milk given also varies from one milking to the next.

I have made some experiments upon the character of milk taken from the first and last portions of the milking; also, on the milk obtained from each teat separately. The results of these experiments are here subjoined. These examinations consisted of determining the specific gravity, the per cent. of fat by means of Feser's lactoscope, and testing the milk by an instrument called the pioscope. This little instrument is certainly of value in determining the character of a milk, and can be purchased for the small sum of fifty cents.

August 25, 1885: Evening milk of one cow; first and last milk tested. The amount taken for each examination was an ordinary glass tumblerfull, and this was obtained partly from each teat:

First milk, ...	Pioscope reading, poor. Lactoscope reading, 1¾ per cent. fat Specific gravity=1031, at 68° Fahr.
Last milk, ...	Pioscope reading, richer than very fat. Lactoscope reading, over 6 per cent. fat. Specific gravity=1020, at 64° Fahr.

August 27, 1885: Examination of first and last milk of evening's milking:

First milk, ...	Fat, 1¼ per cent. Specific gravity=1031, at 80° Fahr.
Last milk, ...	Fat, 5½ per cent. Specific gravity=1021, at 78° Fahr.

September 5, 1885: Tests of milk drawn from each teat. In these experiments the entire milk of each teat was taken:

Left front teat milked first, ...	Amount of milk=15½ fluid ounces. Specific gravity=1032, at 68° Fahr. Fat, 3½ per cent. Pioscope, slightly above normal.
Right front teat milked second, ...	Amount of milk=21½ fluid ounces. Fat, 3¼ per cent. Specific gravity=1031, at 66° Fahr. Pioscope, above normal.
Left hind teat milked third, ...	Amount of milk=14½ fluid ounces. Fat, 4 per cent. Specific gravity=1030, at 66° Fahr. Pioscope, richer than normal.
Right hind teat milked last, ...	Amount of milk=23 fluid ounces. Fat, 4 per cent. Specific gravity=1030, at 70° Fahr. Pioscope, very fat.

September 7, 1885: Milk of same cow as given in experiments made on September 5, 1885:

Right front teat milked first, ...	Amount of milk=24 fluid ounces. Fat, 4 per cent. Specific gravity=1031, at 68° Fahr.

Right hind teat milked second, ...	Amount of milk=25 fluid ounces. Fat, 5 per cent. Specific gravity=1029, at 68° Fahr.
Left hind teat milked third, ...	Amount of milk=14¾ fluid ounces. Fat, 4 per cent.
Left front teat milked last, ...	Amount of milk=17½ fluid ounces. Fat, 4 per cent. Specific gravity=1031, at 68° Fahr.

The results of these experiments show that the first milk taken from a cow has a rather high specific gravity and a low per cent. of fat, while the last has a very low specific gravity and a high per cent. of fat; also, that the amount of milk from the different teats varies considerably, and that there is likewise some variation in its composition.

People sometimes judge of the richness of a milk by its color, thinking that a yellowish-colored milk is necessarily richer in fat than a perfectly white milk. A little experience in analyzing milk, or in testing it with a lactoscope or pioscope, will show that this is not the case. I have sometimes noticed that, of two samples of milk, the yellower sample contained the smaller per cent. of fat. A figure of the pioscope is here inserted. In the center of the black disc a drop of milk is placed and the glass plate placed with the unpainted central part on the drop. The milk now assumes a color nearly the shade of one of the colors on the margin of the glass, and is classed under the color on which it most nearly corresponds. This instrument is very easy to use, and is, therefore, of much value. It is doubtless worth its cost to every family. In the course of my analyses of milk, I have sometimes noticed that finely-marked animals proved to be neither good milk or butter-producers.

An analysis of milk taken from a cow three days before calving gave the following results :

Specific gravity, ...	1.050	at 72° F.
Lactose, ... , ...	1.7	per cent.
Albumen and casein, ...	13.57	"
Ash, ...	1.01	"
Solids not fat, ...	16.71	"
Fat, ...	1.7	"

Milk taken from the same cow one day before calving much more closely resembled natural milk.

BIRDS' FOOD.

By B. H. WARREN, M. D., *Ornithologist of the Board, West Chester, Pa.*

The ornithological specialist, to make his branch a subject of utility to an agricultural people, must devote a most careful and critical attention to the food-materials which present themselves in the stomachs of his feathered subjects. In order to arrive at positive conclusions, the investigator should examine the viscera (craw, gizzard, and intestines) of birds at all seasons of the year, and, if practicable, the examinations should be made during every month of the year.

By such means only is it possible to reach specific conclusions as to the usefulness, or want of the same, of any class or species of birds. To conduct a series of food examinations on the species which remain the year round (these birds by ornithologists are termed "residents") in a particular section, is, comparatively speaking, a task which requires only a limited amount of energy and skill. When the specialist, however, undertakes to institute food investigations on species which occur in his region only, as summer or winter residents, or as transitory visitants, his work is restricted to such periods of time as the birds are to be found.

THE THRUSH FAMILY—*Turdidæ*.

The first member of this well-known family to which especial attention is called is the robin, technically known as the *Turdus migratorius*, LINN. In Pennsylvania this species, during the spring, summer, and autumn months, is particularly abundant; during the winter months, it is not uncommon to find small flocks of these birds in cedar thickets, swamps, timbered land, and other similar localities. The geographical range of the robin is extensive; the *habitat*, as given by Dr. Elliott Coues, in "Birds of the North-West," is "continent of North America and portions of Mexico; West Indies, rarely; accidental in Europe."

From repeated interviews with farmers and horticulturists, I find that the robin is very generally regarded as a nuisance; in fact, is esteemed to be a bird whose fruit-eating propensities more than counterbalance the good he does by destroying insect life.

The following notes and remarks on the food, it is hoped, will suffice to show that this species is, at least, somewhat beneficial to agriculturists and pomologists, even though it will, at certain periods of the year, subsist in part on a fruit diet. The subjoined memoranda are taken from my note-book, March, 1879, 1880, and 1883:

No. 1. Male, coleoptera, (beetles).
" 2. " "
" 3. Female, "
" 4. Male, "
" 5. " "
" 6. " "
" 7. " " and small cherry-colored seeds.
" 8. " " grasshoppers and grubs.
" 9. " small worms. } Stomach distended.
" 10. " " " }
" 11. Female, coleoptera and earth-worms.
" 12. " " "

April, 1879, and 1880:

No. 1. ———, coleoptera.
" 2. ———, "
" 3. Male, "
" 4. " "
" 5. ———, "
" 6. ———, "
" 7. Female, " and earth-worms.
" 8. Male, " "
" 9. Female, " "
" 10. Male, " and other undetermined forms of insect life.

May, 1880, and 1883:

No. 1. Female, coleoptera.
" 2. Male, "
" 3. " "
" 4. Female, " and aptera.
" 5. Male, " and earth-worms.
" 6. " " "
" 7. Female, small seeds and few flies.
" 8. " worms and coleoptera.
" 9. Male, spiders.
" 10. Young male, vegetable matter and few particles of oyster-shells.

June, 1879.—The following twenty-three (23) birds were captured on the same date, and in East Bradford township, Chester county, Pennsylvania. The birds were taken in an apple-orchard, or in the act of going to or from cherry trees, located near said orchard. Of the twenty-three (23) birds, thirteen (13) showed evidences of cherries, five (5) of the thirteen revealed only this fruit in their viscera, the remaining eight (8) birds had, in addition, and, certainly with two (2) exceptions, in excess insect food, consisting mainly of small brown and black coleoptera. Two earth-worms were observed. Seven (7) young birds taken from nests, with the exception of one bird that had a small piece of cherry, which, however, was present in connection with a large insect mass, furnished solely proof of an insectivorous diet, which was so comminated as to be almost unrecognizable. Sufficient evidences, however, were present to establish the fact that coleoptera were an important element in their bill of fare. Two (2) birds void of all food materials.

September 30, 1880.—This date took near West Chester, Pennsylvania, (in woods), twenty-five (25) robins; all but two (2) birds had eaten dogwood berries. Seven (7) showed some spicewood berries. One, in addition to spicewood berries, had in its stomach an apterous insect. Another, dogwood berries, with traces of diptera (flies). A third revealed dogwood berries and coleoptera. The food of the remainder of this series (25) consisted of dogwood, spicewood, and poke berries.

September 9, 1882.—Twelve birds examined. Food of all, wild cherries only.

September 21, 1882.—Five birds examined; all had fed exclusively on wild cherries.

October, 1880.—Eighteen examinations:

No. 1. Spicewood and dogwood berries.
" 2. " " " "
" 3. " " " "
" 4. " " " "
" 5. " " " "
" 6. Coleopetra " " "
" 7. " " " "
" 8. Spicewood berries.
" 9. Dogwood "
" 10. " "
" 11. " "
" 12. " " and bivalves.
" 13. " " and small brown seeds.
" 14. " "

No. 15. Chicken grapes and coleoptera.
" 16. " "
" 17. " "
" 18. " "

In Wilson's American Ornithology, volume I, is found the following reference to the robin: "Their principal food is berries, worms, and caterpillars. Of the first, he prefers those of the sour gum (*Nyssa sylvatica*). So fond are they of gum berries, that whenever there is one of these trees covered with fruit, and flocks of robins in the neighborhood, the sportsman need only take his stand near it, load, take aim, and fire; one flock succeeding another with little interruption, almost the whole day. * * * * When berries fail, they disperse themselves over the fields and along the fences, in search of worms and other insects. The fruit called poke berries (*Phytolacca decandra*, Linn.) is a favorite repast with the robin after they are mellowed by the frost."

A paragraph appeared in the public papers intimating that, from the great quantities of poke berries which the robins had fed on, they had become unwholesome, and even dangerous food; and that several persons had suffered by eating of them. The strange appearance (discolored) of the bowels of the birds seemed to corroborate this account. The demand for and use of them ceased almost instantly, and motives of self-preservation produced at once what all the pleadings of humanity could not effect.

Governor Drayton, in his "View of South Carolina," page eighty-six, observes that "the robins in winter devour the berries of the bead tree (*Melia azedarach*), in such large quantities that, after eating of them, they are observed to fall down and are readily taken. This is ascribed more to distension from abundant eating than from any deleterious qualities of the plant." The fact, however, is, that they are literally choked, many of the berries being too large to be swallowed.

Edward A. Samuels, Boston, Massachusetts, in a most carefully prepared article entitled "Value of Birds on the Farm," published in the annual report of the Commissioner of Agriculture for the year 1867, says: "In summing up the operations of the robin for the whole year, we find that it is beneficial one hundred and forty-two and one half days, injurious fifty-nine and one half days, and neutral one hundred and sixty-three days. The good that it thus renders the interests of agriculture is certainly sufficient to entitle the bird to the consideration of the farmer at least, and when its services are weighed against the comparatively small injuries inflicted on a few small crops, the ill treatment that it too often receives ought to be regarded as shameful and outrageous."

The above summary was made by Mr. Samuels, aided by other equally competent and reliable observers, after repeated examinations of food-stuffs had been during all months of the year.

In volume III, Audubon's "Birds of North America," we find the following reference to the robin's food:

"During the winter, they feed on the berries and fruits of our woods, fields, gardens, and even of the ornamental trees of our cities and villages. The holly, the sweet-gum, the gall berry, and the poke, are those which they first attack; but as these fail, which is usually the case in January, they come nearer the towns and farm houses and feed voraciously on the caperia berry (*Ilex caperia*), the wild orange berry (*Prunus carolinianus*), and the berries of the Pride of India (*Melia azedarach*). With these they are often choked, so that they fall from the trees and are easily caught. When they feed on the berries of the poke plant, the rich crimson juices color the stomach and flesh of these birds to such an extent as to render their appearance, when plucked, disagreeable; and although their flesh retains its usual savour, many persons decline eating them. During summer and spring, they devour snails and worms, and at Labrador I saw some feeding on small shells, which they probed or broke with ease. Toward the approach of spring, they throw themselves upon the newly-plowed grounds, into the gardens, and the interior of woods, the undergrowth of which has been cleared of grass by fire, to pick up ground-worms, grubs, and other insects. * * * * * * * They also now and then pick up the seed of the maize from the fields."

Prof. Gentry, in his "Life Histories of Birds," volume I, says: "The following insects constitute an important part of the food of the young: Earth-worm, ground beetle, measuring-worms, rose-slug, sulphur butterfly, cabbage butterfly, in their larval condition; besides various dipterous insects, as the house fly, white-lined horse fly, stable fly, mosquito, and others. Add to these the fruits of the several varieties of cherry, the strawberry, and the various species of *Rubus*, or blackberry, and you have a bill of fare not to be despised. * * * * Of all species, the robin is pre-eminently insectivorous. It is true that it will feed upon seeds and berries when insect-food cannot be obtained. Besides the berries mentioned above, we have found it feeding upon *Rubus villosus* and *Rubus canadensis* among blackberries; the wild choke-cherry, the cedar berry, its near cousin the common juniper, and the sweet gum. In early spring, various species of beetles constitute its principal food. An examination of the stomachs of several birds revealed traces of the following coleoptera, which mostly dwell underneath stones, logs, and the bark of trees.

Dicœlus dilatatus, *Harpalus pennsylvanicus*, *H. compar*, *Pangus caliginosus*, *Scarites subterraneas*, *Casnonia pennsylvanica*, *Platynus cupripennis;* larvæ and imagos of *Lachnosterna quercina*, *Cratonychus cincreus* among beetles. House fly, white-lined horse fly, stable fly, mosquito, crane fly, *Syrphus obliquus* and *Scatophago furcata* among diptera; *Formica sanguinea* among hymenoptera; *Œdipoda nebulosa*, *Œ. sulphurea*, *Caloptena femur-rubrum* among grasshoppers and the black cricket; larvæ of *Anisopteryx vernata*, *Eufitchia ribearia*, *Geometra catenaria* of Harris, corn worm, *Pieris oleraceœ*, *P. rapœ*, *Colias philodice*, *Spilosoma virginica*, apple borer, and *Harrisina Americana;* besides the earth-worm.

The Cat-bird (Mimus Carolinensis). Gray.

This species occurs in Pennsylvania as a summer resident, and is abundant. It arrives usually during the last week in April, and departs for its winter resorts about the first of November. Following is the result of seventy examinations which I have made:

May:
No. 1. Male, aptera and coleoptera.
" 2. " berries.
" 3. Female, coleoptera.
" 4. " "
" 5. Male, "
" 6. Female, "

September 26, 1882:
No. 1. Male, cherries and spicewood berries.
" 2. " " " " "
" 3. " " " " "
" 4. " grapes " " "

No. 5. " " " coleoptera.
" 6. — " " "
" 7. Female, " " spicewood berries.
" 8. " " " caterpillars.
" 9. Female.
" 10. "
" 11. Male
" 12.
" 13.
These five birds showed berries with seeds of the plant commonly known in this section (Chester county, Pa.,) as "Solomon's Seal."

In the stomachs of twenty (20) additional birds of this species, taken September 26, 1882, spicewood berries were found in greater or lesser amounts. Ten (10) of the number had, in conjunction with berries of the "spice-tree," those of the "arrow-wood," also fruit of the wild grape. In five (5) were found evidences of dipterous and coleopterous insects present in connection with berries previously specified.

September 28, 1882.—Chester county, Pa., sixteen examinations resulted as follows: Three, coleoptera, in connection with berries, mainly spicewood; two, aptera only; the remaining eleven (11) showed only berries, viz: spicewood, elder, cherries, and grapes.

September, 1880, 1882, and 1884.

No. 1. Male, grapes.
" 2. " "
" 3. Female, coleoptera and vegetable matter.
" 4. " young, poke berries (*P. decandra*).
" 5. Adult male, elder-berries.
" 6. Female, young, grapes and black-colored seeds.
" 7. " " " " " " "
" 8. Adult, male, coleoptera and berries.
" 9. Young, male, spicewood berries.
" 10. " " " "
" 11. Female, spicewood and coleoptera.
" 12. " " grapes.
" 13. " " "
" 14. Male, " " and diptera.
" 15. Female, " " " traces of coleoptera.

From Prof. Samuel Aughey's report on the locust-feeding birds of Nebraska, the following mention is made of the cat-bird: "Abundant in the woody portions of Nebraska, especially along streams of water."

Number.	Locality.	Date.	Locusts in the stomach.	Other insects.
1	Dakota county, Nebraska,	June 4, 1865	37	10
2	Do........ do	June 6, 1865	31	12
3	Burt county, Nebraska,	June 9, 1867	24	7
4	Lancaster county, Nebraska,	June 15, 1875	40	9
5	Do.......... do	June 14, 1877	20	15

Prof. S. A. Forbes, in his report in the "Food of Birds," published in the "Transactions of the Illinois State Horticultural Society," volume XIII, 1879, refers to the cat-bird's food in the following language:

"My observations of this bird cover the months of May, June, and July, eighteen stomachs having been examined during the first month (one taken April 30, being included in these), nine in the second, and ten in the third.

"In the stomachs taken in May, I found nothing but insects, myriapods, and spiders. The principal elements at this time were ants, nineteen per cent.; caterpillars, sixteen per cent.; adult crane-flies, twenty-three per cent., and beetles, nineteen per cent., including seven per cent. of *carabidæ* and six per cent. of *curculionidæ*. The latter were chiefly of the two *Ithycerus noveboracensis* and *Epicœrus vadosus*, injuring fruit trees by eating the young leaves and gnawing the twigs, but not attacking the fruit. Five per cent of the food was orthoptera, including one white cricket (*Orcanthus*), four per cent. spiders, and nine per cent. vegetarian thousand-legs (*Diplopoda*).

"A large number of the eggs of the crane-flies, kindly determined for me by Prof. C. V. Riley, were found in the stomachs of these birds. As they were always found associated with fragments of the adult insects, there is nó proof that the cat-bird takes these eggs separately. During this month, notwithstanding the number of carabidæ taken, there remains apparently a considerable margin of benefit in favor of the birds.

"In June, the insect average falls to sixty-four per cent., as against eighty-seven per cent. of the previous month. This loss is, unfortunately, most evident in the neutral or injurious elements, and amounts to little or nothing in the beneficial—ants being now ten per cent. of the food, caterpillars eleven per cent., and crane-flies thirteen per cent.; while the carabidæ keep up to six per cent., curculios are reduced to two per cent., spiders and myriapods to one and four per cent. These deficiencies are, of course, made up by the appearance of small fruits in the diet, averaging twenty per cent. of currants and raspberries. These figures, strictly construed, would indicate a balance against the bird; and, taken by themselves, I don't see how they can even be forced into support of the theory that the cat-bird is any peculiar blessing to the fruit-grower at this time.

"In July, the bird seems to become thoroughly demoralized. It makes the heart of a friend sick within him to scan the columns of the averages. The ants drop to two per cent. of the food, the caterpillars to three per cent., the carabidæ rise to ten per cent., injurious beetles are only one per cent., œthoptera but one per cent., spiders and thousand-legs stand each at four per cent., and small fruits climb to sixty-three per cent. If all cat-birds ate like this at all seasons of the year, we should certainly class them, with curculios and potato beetles, as most grevious pests. As far as these ten birds indicate anything, they seem to me to indicate that the cat-bird in July is, to say the best of him, a blessing pretty thoroughly disguised. Taking the whole three months together, adjusting and comparing the values of his ten per cent. of ants, ten per cent. of caterpillars, twelve per cent. of crane-flies, eight per cent. of carabidæ, four per cent. of leaf-chafers, three per cent. of curculios, two per cent. of œthoptera, three per cent. of spiders, and six per cent. of myriapods, I would estimate that he has, at most, an unexpended balance of about seven per cent. of injurious insects with which to pay for twenty-seven per cent. of fruit." The reader will notice, that in addition to my own notes on the food of these two common and most familiar species, there have also been added the observations of other specialists who have devoted a particular care to the food question.

The other members of the thrush family, which occur in Pennsylvania as natives and migrants are omitted from this paper because of limited space and time.

BLACKBIRDS' FOOD.

Facts from the Diary of a Field-Working Naturalist, Showing the Piscivorous Habit of two Species of the Genus Quiscalus.

By B. H. Warren, M. D., *Ornithologist of the Board*, *West Chester*, *Pa.*

These decidedly omnivorous birds are, I am fully convinced, after a most careful study of their dietary, markedly inclined to show preference for an animal diet, consisting largely of noxious worms and insects. Until within the last year, however, I was not aware that members of the finny tribe formed an item of no mean proportion in the *menu* of the blackbirds, viz: Crow blackbird (*Quiscalus purpureus*) and Boat-tailed Grackle, (*Quiscalus major.*)

At various seasons during the past four or five years, I have examined the stomachs of over seven hundred of the crow blackbirds, captured chiefly in eastern Pennsylvania and Delaware. A detailed report on the food of this species during the months of March, April, May, June, July, August, September, and October can be seen in the Agricultural Report of Pennsylvania for the year 1883. In that report will be found recounted the food-stuffs of six hundred and sixty blackbirds, none of which, however, gave the slightest evidence of a piscivorous inclination. Since 1883, and subsequent to the publication of the paper above referred to, examinations of one hundred and seventy odd crow blackbirds have been made. One hundred and thirty-two of these birds were taken in eastern Pennsylvania. In relation to this series are herewith presented the food-notes as recorded at dates of examination:

March.—Seventeen examinations: Nine birds had fed exclusively on insect life, consisting mainly of *Coleoptera*, (beetles;) two, grubs and small brown-colored seeds; one, corn, (maize;) three, chiefly insects, with small amount of corn and wheat; one, wheat-bread; one, small piece of beef and portions of a beetle.

April.—Twelve examinations: Six, various forms of coleopterous insects; three, beetles, few earth-worms, and grubs; one, small seeds; one, several grains of corn; one, unrecognizable mass of vegetable materials.

May.—Nine examinations: Six, cut-worms only; two, beetles; one, small seeds, beetles, and grains of corn.

June.—Twelve examinations: Seven, cut-worms only; three beetles, and flies; two, cherries.

July.—Six examinations: Three, beetles and blackberries; one, beetle and portions of a bird's egg; one, berries and insects; one, wheat.

August.—Thirteen examinations: Seven, corn; four, with slight traces of berries and some few insects; one, *Coleoptera* and *Orthoptera*, (grasshoppers;) one, berries and small black seeds.

September.—Eleven examinations: Five, corn; three, berries and few insects, (chiefly beetles;) three, insects only.

October.—Fifty-one examinations: Nineteen, corn only; twelve, corn and beetles; five, beetles; eight, grasshoppers; two, oats; one, wheat; two, berries; one, beetles and portion of a bivalve, (shell;) three, corn, *Orthoptera*, and other forms of insecta.

December.—One examination: Specimen numbered 101596; National Museum, Washington, D. C. An adult female, taken December 29, 1884, Chester county, Pennsylvania, contained in its viscera mainly corn and other vegetable matter, probably wheat.

Since the latter part of February of this year, (1885,) I have dissected the alimentary tracts of forty-four of the species *purpureus*, seventeen of which were secured in Florida, along the St. John's river. These seventeen examples, obtained at various periods from March 1 to May 7, showed generally an insect-food preference—*Coleoptera*, principally. Six of the number, however, revealed unmistakable evidences of having taken, as nourishment, fishes. In one bird, No. 83, adult male, March 3, 1885, "Camp Old House," Volusia county, Florida, were found five small-fry or "darters"—as a fisherman, who was intently watching the "business," denominated them—together with two black beetles and a grub. The five remaining birds have added to them the data, &c., as appended:

"*No. 163.*—Alcoholic specimen; National Museum—adult male—April 21, 1885; Hawkinsville, Florida. Several *Coleoptera*, one or two mulberries, and three fishes; one of which is apparently a minute example of a catfish.

"*No. 1269.*—adult male. April 10, 1885; Hunters' Rest, Orange county, Florida. Presented by R. L. Dade. Food: 'water leach,' aquatic beetles, several small, black and brown seeds, tail, fins, and part of a head of a small fish.

"*No. 197.*—adult male. March 14, 1885; Volusia, Volusia county, Florida. Food: brown beetle, two grains of oats, part of a grain of corn, numerous scales and bones, also heads of two minnows. At least two thirds of the food-mass was made up of fish-remains.

"*No.* —— —adult female, breeding. April 29, 1885; 'The Swamps,' Volusia county, Florida. Food: one craw-fish, one minnow, and several dipterous insects.

"*No. 237.*—adult male. Deland Landing, Volusia county, Florida. Food: lot of scales, bones, and fin of small fish, with remains of a green-colored beetle."

Of the forty-four birds above mentioned, twenty-seven were taken in Chester county, Pennsylvania, during May, June, and July, feeding chiefly along the fertile banks of the Brandywine creek. In this series, however, not a single individual was found to possess a trace which would show in the northern race a fish-food want.

A Florida fisherman, during the early part of April, 1885, caught a number of "perch," which spoiled before a market could be found for them. The decaying carcasses were tossed into the river to float away or to be "gobbled up" by the voracious "catties." Several of these defunct fishes lodged among the shell-rocks lining the banks. Probably an hour after the cast-aways had lain along the river side, three crow blackbirds were seen—quoting the phraseology of a "cracker" who was present at the time—"to jine de fish and feast 'emselves to plum fulness." After the departure of the sable visitants, an inspection of the feeding-place revealed that the birds had picked out the eyes of seven, or all but one of the fishes, three of which were also considerably torn about the abdominal regions. The mutilated condition of the belly muscles is mainly attributed to the fact that the fish had been eviscerated before having been thrown away, hence these incised parts were more accessible to mandibular action than other and unbroken parts of the scaly anatomy. Certainly, there is no obvious reason why the abdominal and neighboring pectoral portions of a "perch" should be more palatable to the sprightly "White-eyed Jackdaw," as the native Floridians are accustomed to term the species *purpureus.*

The Boat-Tailed Grackle.

This magnificent bird, familiar to the ornithologist as *Quiscalus major*, and by the residents of semi-tropical Florida universally styled "Jackdaw," is most plentiful along the sinuous St. John's river, frequenting, especially when feeding, the "lily-pads," among which abound innumerable forms of aquatic insect-life, much of which is eagerly devoured by the argus-eyed boat-tails.

The presence of insects on these aquatic vegetable growths serves to allure legions of fishes, large and small, which latter receive from the jackdaw a most considerate attention, as one would naturally judge after having subjected to examination the viscera of nineteen (19) birds killed in March and April, 1885, and ascertained that nine (9) of this number had in their food receptacles undeniable evidences of minnows; in fact, so marked is the piscivorous nature of the species that the amount of fish-food was, it can safely be remarked, in these nine examples, equal in bulk to the various materials, such as insects, grain, seeds, and a few bivalves, which were present in the whole number examined. (Two birds were void of food materials in alimentary canals.)

In relation to the fishing methods adopted by the "jackdaw," the following is taken from the proceedings of the Philadelphia Academy of Natural Sciences for 1879:

> "Joseph Wilcox spoke of the custom of some crow blackbirds (**Quiscalus purpureus*) of eating fish, and their method of catching them through the intervention of another animal. Last winter, when on the shore of the St. John's river, near Lake Jessup, Florida, he observed an unusual commotion among the crow blackbirds, which were congregating near the water, and anxiously looking into it. Soon a loud splash and noise were made in the vicinity by a large bass in making a charge upon his favorite food, the small fry, which, in their frantic efforts to escape, jumped out of the water, and many of them fell upon the land. The blackbirds, which were evidently experts at the game, immediately pounced upon the small fish and swallowed them before they had time to hop back into the water. This performance was repeated many times."

CAN SUGAR-MAKING BE MADE PROFITABLE TO THE PENNSYLVANIA FARMER?

By N. F. Underwood, *Member from Wayne.*

The amount of sugar annually consumed in the United States is something immense. Probably in no other country is so large a quantity used, *per capita*, as in our own. The imports of this commodity amounted, in

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*Note.—In a conversation which I recently had with Mr. Joseph Wilcox, I was informed that the species of which he spoke was not *purpureus*, but was the Boat tailed Grackle, (*Quiscalus major*,) which latter name the reader is respectfully asked to substitute in reading the above given quotation.—*B. H. Warren.*

1879, to seventy-six million five hundred thousand dollars, one eighth of which was for molasses, which would indicate that, with an annual consumption exceeding by this amount the total home production, the sugar-making industry of our country is in no present danger of being overdone. The sources of supply of the saccharine products, including sugar, molasses, and syrup, (and we understand them as being all included in the question,) may be briefly stated as four, with a fifth possible, one only lately beginning to attract attention. There are: First, the true sugar-cane of tropical and semi-tropical latitudes; second, the sugar-beet; third, the various and numerous species of sorghum; fourth, the sugar-maple, and lastly, the common maize. The first of these, while of more importance, so far, than all the others, is debarred from cultivation in our State by its climatic requirements, and need not be considered here. The manufacture of sugar from beets has been carried on successfully for a number of years past in some European countries, notably in France, but so far attempts to work out the problem of producing beet sugar in this country have not succeeded to any encouraging extent. The idea of the profitable production of sugar from beets in the United States has not, however, by any means been abandoned, and it is not unlikely that final success may crown the efforts of those who are still experimenting in this direction. It is, at least, yet too soon to say that the thing cannot be done. Such experiments, however, come within the province of the capitalist and the man of science, rather than the farmer. In the present status of this industry, the farmers of our State will not regard it as a profitable source of income. So far as sorghum is concerned, it has been grown for many years by the farmers of the West, and doubtless many families have thus supplied themselves with syrup, who otherwise would have lacked either this or its equivalent; but as a source of sugar supply, it has been mostly, or entirely, a failure under individual management. Now that it seems to be a well-settled fact that sugar can be readily manufactured from sorghum, and that capitalists who have invested money in mills and machinery for making sorghum sugar and syrup are encouraged by the experience of the past season, it seems likely that the business may assume greatly increased proportions, and that farmers may find it profitable to grow the canes and supply the mills which may be erected in their vicinity. It is, perhaps, yet too soon to be very sanguine about supplying all our country's lack of sweetness from this source, yet the prospect seems to be an encouraging one that large results may be expected from this quarter. Concerning the experience of the past season in the manufacture of sorghum sugar, we quote from the crop and market report, as published in the *Country Gentleman*, of December 13, 1883, as follows: "The company at Champaign, Illinois, which has had faith enough in the business to invest fifty thousand dollars in it, have worked up four thousand two hundred tons of cane, which grew at the rate of ten tons per acre. From this there were obtained one hundred and sixty thousand pounds of sugar, and thirty thousand gallons of syrup. This is at the rate of three hundred and eighty pounds of sugar, and seventy gallons of syrup to the acre. The cane was injured by frost as much as was corn in that section. Last year the yield of sugar was twelve per cent. of the juice, this year it was only eight per cent., or two thirds of a crop, while corn was hardly half that. The company estimate that in any average year the yield will be sixty-five pounds of sugar to the ton of cane, and six hundred and fifty to the acre, and six gallons of syrup to the ton, and sixty to the acre, on fair corn ground. The sugar was so pure that refining was not necessary, as it went direct to retailers as a good *C* sugar. The syrup sold wholesale at forty cents per gallon. At Sterling, Kansas, there is a factory, the company owning it having put one hundred thousand dollars into it. This is the first season there, and they crushed five thousand seven hundred and fifteen tons of cane, from which they made two hundred and three thousand pounds of sugar, and thirty-five thousand gallons of syrup. The same process of reduction is followed as at Champaign, Illinois. The product grades as fine Southern C. Both companies have made contracts for double the quantity of cane next year, and, with an average season, expect a large return above cost." The cost of manufacturing in the above instances is not given, neither is it stated what the farmers who raised the cane received for it; but it is fair to conclude that they considered the business a remunerative one, or they would not have been willing to make contracts for another season. In connection with this, some interesting facts are set forth in the bulletin of Prof. George H. Cook, director of the New Jersey agricultural experiment station, giving a full account of the experiments made the past season, with the object of determining the effect of fertilizers upon the formation of sugar in sorghum, and to prove that, by the present system of working the cane, more than one half of the sugar formed in the plant may be wasted, and that even when a mill yields fifty to sixty per cent. of juice, it may still have more sugar in the bagasse than it extracts from the cane. It is not our purpose to follow in detail the results given of the effects of the various fertilizing elements upon the sugar development in the sorghum plant, interesting as they are, but simply to call attention to the fact that, as hitherto only a part of the available material of this plant has been utililized, the profits of its cultivation and manufacture seem likely to be much increased when some method of securing the whole of the saccharine material contained in it shall have been discovered. That this will soon be accomplished, there can be no reasonable doubt, for modern science laughs at difficulties of this kind. The production of sugar in the United States has hitherto been confined almost exclusively to the extreme Southern sections; but should the now hopeful prospect of the sorghum interest be realized, the whole corn-producing area of the country will share in the benefits accruing from its development. It will, however, in the future, to be successful, be carried on as a coöperative work, and when mills shall have been erected in Pennsylvania, and a demand created for the raw material, the farmers of our State will be found ready to meet the demand by devoting a portion of their fertile acres to the growth of sorghum-cane, or, peradventure, they may be found contributing of the produce of their corn-fields, to keep the wheels of the mills in motion, should that material be proved available. But there are our sugar-maples—acres of them upon the most of the farms in many sections, whole forests of them in some still largely wooded counties—indigenous in our State throughout nearly all its borders. Ready at hand to yield an annual return, without care or cultivation, it gives up its sap as freely as the springs their water. Are we making the most of this ready means of supplying our wants as consumers of sweet things, or are we not rather neglecting that which is capable of supplying us with the best, and accepting something in its stead which is inferior in quality, many points off in flavor, too frequently adulterated and unwholesome? The process of converting the sap into either sugar or syrup is simplicity itself. The novice at the opening of the sugar season becomes the skilled operator before its close. No costly and complicated apparatus is needed for the work. The purifying process, so difficult in treating the juices of sorghum, is successfully performed by unskilled sap-boilers, who probably could not tell whether the operation was a chemical or mechanical one.

The one essential point in making a tolerably good sample of sugar or syrup, even with the rudest outfit and the most primitive methods of evaporation, is that strict cleanliness shall be observed. But the methods of the pioneers, who hewed down the forests of our State - the maple trees along with the others— are not to be recommended to the farmers of to-day. Improvement both in camp and field, rural as well as military, is the order of the present, and no grove is so dense as to shut out innovations and inventions. The well regulated sugar camp of to day is no exception to the rule, and in it may be found many appliances for lightening the labor, increasing the yield, and improving the quality of the product. We would not, if we could, go back to the conditions of the pioneer "sap bush," yet we would like to see preserved, for the benefit of the future generations, a picture of what, to many members of this Board, is doubtless a vivid memory of early life. The primitive forest, almost as yet untouched by the settler's axe, with giant trees, of many species, the maple in the majority. The wide and shallow sap-troughs, hewed out from sections of tree trunks, split in half, which served to catch and hold, not only the sap as it flowed from the trees, through the sumac "spiles," inserted in a hole bored with an inch augur, but all the rains and snows and dirt which came down during the sugar season. The great store-troughs, fashioned from the bole of perhaps a huge hemlock, in form like the water craft known as a "dug-out," yet lacking the pointed and unturned prow and stern, in which the sap as it was brought to the boiling place in two wooden buckets suspended, at either end of a sap-yoke, was stored until it could be boiled down. The great iron kettles, suspended from a pole, which, in turn, was supported by crotched sticks set in the ground at a safe distance from the fire,--perhaps a cabin near by, or a rude shelter of boughs, and this completed the outfit. And then, when a good run of sap came, what a busy and exciting time! For one day, for two days, all would go well, but sometimes the run did not stay at that, but kept on running, week days, Sundays, all days alike, until kettles and store-troughs, sap-troughs and buckets were full to overflowing. Day and night the fires must be fed, the kettles kept filled, the overflowing troughs relieved, and often the boy who kept up the camp fire through the night would be kept wide awake by the howl of the wolves, his alertness spurred by the thought that wolves usually keep away from a bright fire. This is no picture of imagination, but the writer, and no doubt many others, can testify to its reality. But the sugar camps of the original forest growth have, in many sections of our State, gone the way of the hemlocks and the pines. They have been felled by the axe, upturned by the winds, or killed by forest fires. In some sections, fine groves of maples of second growth, fostered by the care of the land-owner, and proportioned to withstand the winds to which their situation may expose them, may now be found. From these, and from such older groves as still survive, considerable quantities of sugar and syrup are annually made: yet, in the absence of statistics, we think it safe to assume that, owing to the destruction of the trees and to other causes, the production is much less than formerly. Among the reasons which may be urged in favor of the profitableness of maple sugar making we may name the following: The work comes at a time when other work is not pressing, hence the sugar made is so much added to the annual income. The revival of this branch of industry would tend to encourage the planting and care of groves of timber, and thus a two fold benefit would be secured. Upon many farms, in some rocky or neglected portion, a growth of young maples springs up, which, if cared for and protected from cattle, and perhaps a few trees planted in vacant places, would in a few years become thrifty groves, and in time fine sugar orchards, and the most valuable portions of the farm. In very many sections of the State, seedling maples, literally by the thousands, can be found in the woods, and with little labor, a plantation of a few acres could be made, which would soon become the pride of the owner, and in the end a well-paying investment. In addition to this, it may be said that maple sugar, and especially maple syrup, have a distinctive flavor, unequaled and unapproached by any other in the list. It has, in consequence, a value not affected by the price at which its rivals may be offered, and will always be in demand, at good prices, as a table luxury, in spite of sorghum syrup, the sulphur-bleached molasses of the Southern refineries, or the "silver drips" of the glucose factories. The cost of fitting up a modern sugar camp, with all the best appliances for catching, storing, and evaporating the sap, need not be large. Everthing necessary for working an orchard of two hundred trees, including metal spouts, tin buckets provided with covers, suitable shallow pans for evaporating, with brick or stone arches in which to set them, sufficient shelter for protection from storms, together with such storage vessels as may be needed when rapid evaporation is practiced, may all be provided at an expense of not far from one hundred dollars. All these, if properly housed and protected when not in use, would last for many years. In this, too, as in the case of sorghum, the principle of coöperation might be practiced to advantage, and owners of contiguous groves might club together, and, by the purchase of one of the best-improved evaporators, reduce the sap from several orchards at one place, at a saving of cost and a gain in quality. We have in mind one instance where a resident of a village, owning a small grove of maples, has set up an evaporator and a number of his neighbors haul their sap to it, to be evaporated upon shares. Thus several families are supplied, at little cost, with maple syrup of fine quality, and the owner of the evaporator finds no difficulty in disposing of all his surplus at satisfactory prices. The plan is a feasible one for many localities, and worthy of a more general adoption. The subject of the planting and care of trees has received much and deserved attention in the work of this Board, and we have no desire to trespass upon the prerogatives of the Committee on Forestry, yet would like to say a word in favor of the maple as one of the species most worthy of cultivation. It grows naturally in most of our soils, is easily transplanted, its rate of growth is good, its wood is valuable for many purposes, its form is most symmetrical, and, with its cleanly and graceful foliage in summer and its beautiful autumn tints, it presents a fine appearance, whether standing alone, in rows along the roadside, or massed in groves and parks. When we add to this its sugar-yielding value, it would seem that its claim to favorable consideration on the part of land-owners was well established, and that the farmers of Pennsylvania, in devoting some portion of their land to its growth would, besides tempering the heats of summer and the rigors of winter, add value to their farms, luxury to their tables, beauty to their landscape, and a general good and permanent benefit to the State.

The subject having been declared open for discussion:

J. A. **Herr** of Clinton. With regard to the profits of the manufacture of sorghum, I have but little to say. I think the essayist stated that it may be sold with profit at forty cents a gallon. In the immediate neighborhood in which I live we have been working a little in that direction, but I do not believe we could make it profitable at that price. I have had no trouble in selling all I had to spare at seventy-five cents a gallon: and at that price I think it is profitable. Our average crop is, perhaps, not more than eighty to one hundred gallons to the acre, but we have occasionally produced as high as one hundred and fifty to two hundred gallons per acre. We pay twenty cents a gallon for having it manufactured, besides hauling it to the mill and crushing it. Twenty cents we paid for evaporating it, and then, at the price I quoted, I think it is profitable. We have been practicing for three years, and it has improved in quality every year. I believe it is destined to become an important industry at no distant day in our part of the State.

Mr. **McDowell** of Washington. I have one suggestion with regard to sorghum. We know that the syrup has a peculiar taste. While out West this season, (I was there during the time they were manufacturing it,) I noticed that one farmer has a practice of using yellow clay, and it is pretty hard to get in. He mixed this up with the syrup, just as it comes from the mill. It is not run into the evaporator until the next day. It is all stirred through, and it has a purifying effect upon the syrup which frees it from this peculiar taste. I do not know whether any of our people in Pennsylvania are practicing this, and I merely make this suggestion that if there is anything beneficial in it, we may have the benefit. It is thereby freed from that objection, and the molasses sells much higher on that account.

Dr. J. P. **Edge** of Chester. I think that the source of supply for sugar for this latitude will ultimately be derived from the beet, although, recently, failures have been experienced in the attempt to manufacture profitably. But, I think, the time is approaching when that will be overcome and large quantities of sugar will be produced where the beet is cultivated in this State. I have seen a recent statement that the production of sugar in France and Germany has universally increased, and there will be a large importation of beet sugar into this country this year. It is superior to any other sugar I have used—very much superior to the cane sugar and very much more so to the sorghum sugar. Maple sugar, of course, has a characteristic of its own which no other sugar has; but the beet sugar, as made in Europe, is unquestionably the best that is manufactured.

D. **Wilson** of Juniata. In Europe, and especially in France, it has been found that while the sugar-beet grows well and attains great size and is full of juice, yet it has not the proper amount of saccharine matter in it. I think that is the experience of our friends in Delaware: that, while there was juice enough in the beet, it was not sweet. I would be a little afraid that that would be the case with sorghum. It may have the juice and yet the weather may not be warm enough or the season not sufficiently long enough to make it sweet; and, if it is not sweet, it will not make sugar. If sorghum will ripen wherever the ordinary corn crop will ripen, it will do.

H. L. **Scott** of Bradford. Wherever corn will ripen, the sorghum will ripen. In the southern part of the State, the early amber cane ripens fully as early as the corn crop.

Prof. W. H. **Jordan**. Mention has been made of the variation of beets in the amount of sugar. Beets are much more susceptible in that direction to the influence of phosphates than sorghum. A highly nitrogenous fertilizer has a tendency to increase the size; but that increased size (where nitrogenous fertilizers are used) is at the expense of the sugar in the juice, because they mature late. On the other hand, phosphate has the effect to cause early maturity and an increased percentage of sugar, but the beet does not grow so large. Our German friends have adopted two kinds of fertilizers. Sorghum is not so susceptible to the influence of fertilizers as are beets—that is, in the change of the percentage of sugar.

Prof. R. S. HUIDEKOPER. I have had no practical experience in the manufacture of sugar myself, but saw a few bags of sugar from Mr. Scott's farm in New Jersey, which was as beautiful and sweet as any Southern cane sugar could be. The success of their work has been so great that next year (1884) they will have over twenty-five hundred acres of ground in sorghum, and I will not venture to state the number of pounds of sugar they expect to make. The production last year (1883) was two hundred thousand pounds of most beautiful sugar.

NOTE BY THE SECRETARY.—It is to be regretted that want of space compels the exclusion of the greater portion of the discussion which followed the reading of Mr. Underwood's essay. From a careful review of all of the discussion, (as preserved by our stenographer,) it is evident that the production in Pennsylvania must be discussed and judged from a single standpoint—that of PROFIT. If, by an expenditure of the same amount of capital and labor, the Pennsylvania farmer can produce enough corn, wheat, or potatoes to more than pay for the sugar which he could have produced from the same ground, it will be useless for us to plead the advantages of home production for home consumption, for this will not pay rent nor interest upon mortgages. When the practical farmer is convinced that cane for sugar will not yield him a greater profit than our present crops, he will desert the crop in spite of all arguments based upon tariff and political economy. The discussion brought out very prominently the point that this crop brought with it a greatly increased amount of labor at a time when the working force of our farmer is strained to its full extent, and, of course, at a time when additional labor can scarcely be procured. So far as an opinion was expressed by the members, it was evident that by far the larger number were of the opinion that, up to the present time, the result of the experiments with this crop were not of a nature which would warrant the Board in the statement that it would prove a profitable crop to the average farmer; but, at the same time, it was admitted that the capabilities of the crop were such as would sooner or later place it on our list of special crops, suited to special soils, and successful under the management of certain individuals who can with profit make it a specialty.

THE TRAMP IN HIS LEGAL ASPECT.

By F. K. PATTERSON, *Member from Armstrong.*

The utility of our organization can only be assured by the earnest effort of each of its members. We meet for the purpose of comparing ideas, submitting our theories, gathering together, as it were, the aggregate of our knowledge on such subjects as are brought before us. While my contribution to this knowledge fund may be very small, allow me to assure you it is offered with but one regret, and that is that it is no greater. I realize the grave importance of the subject assigned me, and feel my incompetence to do it justice. It is a question that perplexes the law-makers of our country and one that our best thinkers have failed to dispose of satisfactorily. The subject assigned me, "The Tramp in His Legal Aspect," is a qualified expression, and, that we may not wander from the subject, it is necessary that we have the legal definition of the word "Tramp." In the winter of 1879, the Legislature of Pennsylvania passed a law defining the word tramp and providing for his arrest and punishment, determining that to be a tramp was a misdemeanor, punishable by imprisonment.

This act defines a tramp as "a person going about from place to place begging, asking or subsisting upon charity, and for the purpose of acquiring money or a living, and who shall have no fixed place of residence or lawful occupation in the county or city in which he shall be arrested." From this definition, it would appear that the tramp is one who has made choice of tramping as the business of his life, one who has an irreconcilable dislike to all kinds of honest employment, and has adopted for his motto the old saw "The world owes me a living," and who claims his support in his wanderings as a right or debt due to him. To this class alone would I apply the word tramp as an epithet, and he is unworthy of any commiseration or any better name, for no tinge of shame mantles his brazen cheek at his own baseness and worthlessness when in pursuit of this his adopted vocation. Honor and principle are words without a meaning to him; he would appropriate the orphan's crust or the widow's scanty meal, if better fare is denied him, with as little compunction of conscience as a jackal would have in robbing a grave. He is a kind of beast of prey of the human species, if you will allow such expression. That he is destitute of every manly principle and sentiment is evidenced by his life and actions. That he is capable of imposing himself as a burden upon his fellow-men by deception, falsehood, and threats, fixing himself like a vampire upon the honest, industrious citizen, is sufficient to condemn him alone. But this imposition of himself, as a burden upon others, is not by any means the only objection to this society pest, but, what is a graver subject for apprehension to the law-abiding citizen, is the menace to life and property incurred by these vagabonds tramping the country, boldly resenting, by arson or by murder, all refusals to comply with their demands; they recognize nothing as too sacred for them to claim as their own. Neither age nor sex, life nor property, is secure when they are abroad. This is proved by the murder of households, the outraging of women, the burning and pillaging of property, and such like misdemeanors. And this nuisance is on the increase. I am not able to give their number, but that they are organized with signs and signals, thereby recognizing and communicating with each other, there can be but little doubt. Now the practical question is, how shall we abate this nuisance? Is the law referred to above sufficiently severe in its provisions and broad and practical enough in its details to meet the requirements of the case? The first difficulty that meets us in considering the subject is, how shall we distinguish between the tramp proper and the honest seeker for employment? It is sufficiently hard for the poor laborer that necessity drives him from his home and family, sending him forth as a wanderer to "beg a brother of the earth to give him leave to toil," suffering the refusals and discouragements, the hunger and the fatigue that fall to his lot, without the annoyance of petty officials and the cruel suspicions of crime, or the expensive and tedious vindication by law. This last sad wanderer deserves our encouragement. The hand of charity should be open to him, the heart of sympathy ready to cheer him on. God knows life is full enough of bitterness for him, and any act of ours that may tend to sweeten his life or smooth away its roughness is praiseworthy. In the act of 1879, before referred to, the following provisions are made for the protection of this class of honest laborers, viz: "That if any person so arrested can prove by satisfactory evidence that he does not make a practice of going about begging or subsisting upon alms for the purpose aforesaid, in the manner above set forth, he shall not be deemed guilty of the offense hereinbefore described, and, upon such proof, shall be discharged from arrest either by the magistrate before whom he is committed, or by the court upon the hearing of the case, upon writ of *habeas corpus*." As the act further provides that an act of begging shall be *prima facia* evidence of guilt, it throws the honest seeker for employment, if driven by hunger to ask for bread, liable to arrest, and then the burden of proof falls on him. This is a difficulty we would gladly see him spared, but must confess our inability to suggest a remedy and leave the law effective. The law as it stands is a creditable one: while it holds out the rod of correction to the guilty, it endeavors to interpose the shield of protection to the unfortunate.

While it provides for the punishment of the able bodied mendicant, it licenses the lame, the maimed, and the blind to appeal to the charity of the public. These provisions are praiseworthy; the law fails most in its object; in its provisions for the protection of the innocent who are forced by circumstances to make themselves liable to suspicion as tramps. The citizen has his part to perform in ridding the community of this nuisance as well as the legislators. Laws, to be useful and effective, must be enforced. The citizen in this case has failed to make use of the machinery provided by the Legislature for the extermination of this pest. If the law were enforced, it would rob the tramp's life of its charms, and return to useful and to industrial pursuits many a one that is now wasting his energies without accomplishing any good and burdening the community without any necessity to do so. While charity is a duty, it is neither charity nor duty to encourage vice; and any assistance given the tramp, other than assistance to honest employment, is encouraging and perpetuating this nuisance. If every honest citizen would do his part to see that this law was enforced, exercising his judgment, and not wronging his conscience, giving charity where he believed it due, and calling in the aid of the law where he believed that the proper assistance to lives of usefulness, happiness, and honesty required it, we would then, and not until then, have performed our duty.

The subject being open for discussion:

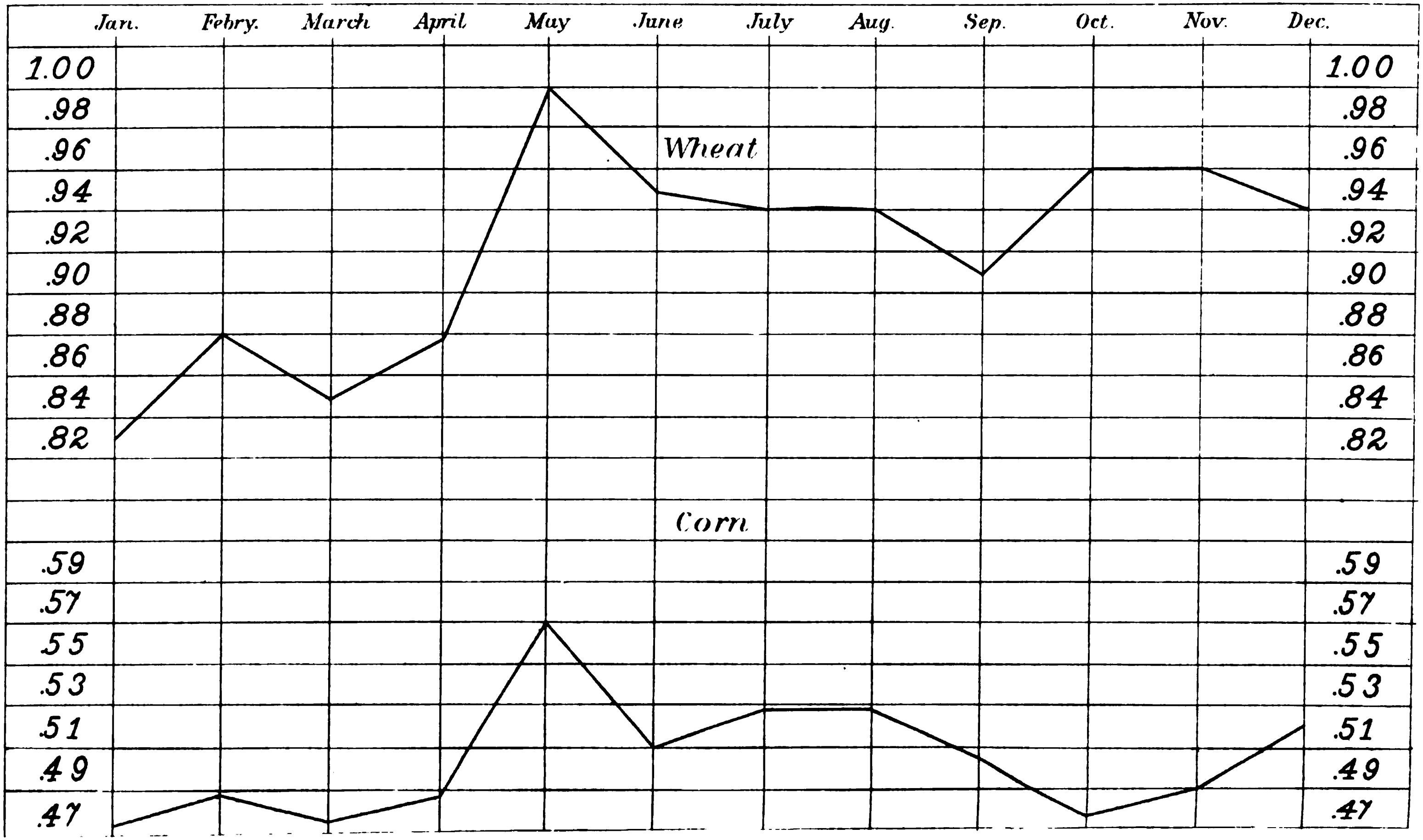
J. McDOWELL of Washington. I have seen as many as five together at one time hid in a corn-shock until night would come on and then taken to jail and kept there. I live on the National road and I know of a man, to all appearances an honest man, who could not find lodging, and some one suggested that he should go to jail and stay there—I don't understand the whole law. He goes before the justice and he has one dollar and the constable has some fee, and the sheriff retains him there and he won't let him out, and he kept him there until he had a bill against this man that wanted to go next morning. Now, that is the way that officers want to make tramps out of persons that are not tramps. It seems to me we need some change with regard to the office of sheriff. It is said in Washington that the office has paid immense profits, until we can come down to Mr. Piollet's idea: pay them by salary, then we can get to the administration of justice.

Sena or DAVIS. I was in the Legislature when the act of 1879 was passed. I did not vote for it, and I have not changed my mind as to the inhuman character, or rather of the injustice, that may be done under the execution of that law. Under pressure coming from many of the counties represented by men who would come up there and tell tales in reference to the evils of tramping that were almost marvelous, it was enacted into a law under a claim that by the vigor and the severity of the law the evil would be done away with. The law goes on the presumption of guilt, whereas I have always been taught to believe that the presumption of innocence attached to any prisoner until proved guilty. At that period of time we were just recovering from a period of great depression and of lack of employment of labor. Immediately following the passage of the law, there was a general demand for labor, and all over the State of Pennsylvania the tramp became almost unknown, again proving to my mind the fact that tramps are not entirely to be condemned; that there is a want and a necessity that drives them to the business of tramping. You have your law upon your statute books that treats them as criminals, considered as criminals, adjudged as criminals, without trials. While the prevailing sentiment in Pennsylvania is in favor of the stringent enforcement of the law, yet it does not change my mind, nevertheless, that the law is exceedingly inhuman and exceedingly harsh, and may act to the condemnation and confinement of innocent men who are driven to become tramps by the necessities of the case. What shall we do with the families of the tramps, with their daughters and their sons. We have condemned them in our statute laws. Though the prison doors are open to them, the moment work becomes scarce you will find our State flooded with these tramps. That brings to my mind that they don't follow that occupation because they desire it, but because of some radical necessity that requires them to do so. As to what shall we do with our tramps is a serious question. I question very much whether we shall ever remove the difficulty by threatening them with confinement in jail. My friend touched upon the subject, that officers made much money in this direction. I find in my own county, that the officers are becoming exceedingly greedy to grasp every one that travels up and down this railroad, in order to put the fees in their pockets. He is already condemned by passing up and down your railroad, and I declare it to be an inhuman and very stringent law.

J. P. **BARNES** of Lehigh. The essay, I think, is a very fine one. It refers to the law by which the tramp may be punished. Now, it supposes the tramp to be guilty, but the tramp is not the judge in that case, and in order that some of our officers in our counties can make a little money out of the tramp, they undertake to tell whether he is a tramp. We are favored in our county with tramps, as well as other sections, and we find that it is a difficult subject to contend with. We find that in the neighborhood of Allentown, large numbers of them, as many as forty, gather at night in places where boilers are used for generating steam, for the purpose of securing a warm place for sleeping, and from there start out in the morning in various directions, to return again at night. They repeat this plan from time to time, in preference to going to jail. In some localities the commissioners put them to work. The present authorities in our place have decided that they shall be fed on bread and water and sleep on the bare floor. Some of them, when they are released from jail, say: "You will soon see me again," and then commit some petty theft in order to get back again. Some of them commence their lives tramps, and end it so.

Hon. R. E. **PATTISON**. I would like to say, on the subject of the tramp, that there is one question that has somewhat interested me in the last seven or eight years, and that is the question of pauperism. I believe this country is yet but in its infancy. Pauperism is keeping apace with population. It is no solution of the question that society provides money for its homes and almshouses for the protection of paupers. I think the greatest protection to give the pauper is to discover why he is a pauper. Take the alms-

Prices of Wheat and Corn in Philadelphia on the 1st of each Month of 1885.



houses, and we have no doubt that they mean to do well; they give their people all they can eat and drink, provide a comfortable bed for them and do the best they know how; and yet I believe they are treating the pauper unkindly; basing my judgment upon the observations I have made in visiting the almshouses. A hearty young woman, seemingly sound in mind and healthy in body, and yet she was confined in a county almshouse. The result of that will be to make her a confirmed pauper, or a mother of paupers. I only offer this, as it suggests itself to my mind. There are in the almshouses to-day eight thousand. There is something wrong in the condition of the mind that will insist, when apparently the individual is sound in body, in the prime of life, upon begging from door to door, or tramping the earth in the summer time and making the almshouses their homes in the winter time. What is the remedy for that condition of affairs is the great question that concerns us all. I only offer it as a suggestion. I don't believe that any person, by reason of misfortune, old age, or anything which he cannot be held accountable for, should be put in a county almshouse. I visited an almshouse where I found in the garret, working, a fine old man, and I asked him his age—eighty-seven. I asked how long he had been there—some time. I inquired as to his history, and I found that this man, in early life, had been an active man in that section; had been father of the common-school system in that section. Later in life he was afflicted with inflammatory rheumatism, and being a modest and retired man, kept it from society until he almost died from want, because he would not make it known. He was not a pauper; by the death of his friends and associations all had gone and he was unfortunate. I believe the cure to be this, and I offer it as a suggestion. I don't believe the State is ready for it yet. I believe they should be distributed; I suppose four districts would cover them. I believe that they should have the best manner of treatment in cleanliness, in medicine, and studying the character of them, and when sufficient information is obtained from their habits of life, then classify them. If a healthy man of sound body and mind will not work, then put him where he must work. That is the solution. You will find the begging propensity comes from an unsoundness of mind, and not insane enough for society to discover a remedy. The remedy for such people is not in the pauper house, but to put them in an insane house and see whether their condition can be cured. These are some thoughts that have passed through my mind with reference to this question of pauperism. We do not understand and do not cure it, and it is growing with our population. I do not offer this in condemnation of any of our county almshouses; they are built well and the inmates treated kindly, but we must discover this: why a man or woman, who is able to work, and will not work, what is the cure to make them work? Towards the close of day, about dusk, you will see children often, boy or girl, or two or three girls and a boy, going from door to door begging, collecting bread and what is handed out from the house, and if you follow them, often you will find that the parents are proprietors of workingmen's boarding-houses. They are used for collecting this food and carrying it to these places. The result will be for those children to grow up to be beggars or tramps, or the parents of beggars and tramps. I believe society should take and arrest, and lock up, and ascertain who they are, where they live, who their parents are; or take a man, where he is from, where his last place of employment was, and see what is the matter. These are the questions that deserve the greatest consideration and thought, for the statistics are furnished now, that pauperism or trampism is developing with the growth of population.

Mr. DEWITT. May I be allowed to say one word in explanation? I have an idea about a cure for these tramps. I have had some little experience with them. I know one man who came to this town, who was called a tramp and punished as such, being unable to make satisfactory explanation. I know that just one word was said to that man. The person said: "Your person is creditable; you are able to work." He said: "I am able to work: all I want to do is to work. I have the disposition to work, and I am willing to work." That man is working in this town to-day. He had been unfortunate, and went from one place to another, and was compelled to steal or beg. If people are unfortunate--if you look at the matter to-day, it will seem that it is more honorable to steal than to beg. This man has gone to work and is industrious, and, I think, he is trustworthy. You take a man, I don't care how low, and you can never benefit that man by punishing him. It is wrong to punish any man, unless he has intended to commit a crime, and unless he has done something which necessitates punishment. But just take the man who is down and you will find that there is a tender spot in that man that some one can reach—you cannot reach him by kicking him. If you take these men running around the country and do something that will render them the slightest encouragement, then something can be done for them. An unfortunate individual may begin life and help himself, in most instances, until this misfortune comes upon him, and you will find that that individual will be a good man. Men who believed they were prosperous and began to build homes went on, but by force of circumstances and by changes were unable to carry their buildings through, and, in hopes to do better elsewhere, they have started out. These are unfortunate, out of food, out of money, and something has to be done. A good many come who are malicious, without any offense or breach of the peace, and you pass a law by which, at once, you are going to make an unfortunate man go right into business when he has no business to go to. If he tries to provide for himself until the opportunity presents itself, without friends, he violates the law and becomes a criminal. It won't answer. You have to do something to encourage a man, if you expect him to act like a man and be a man.

BEST BREED OF SHEEP FOR PROFIT.

By JOHN McDOWELL, *Member from Washington county.*

Naturalists have various theories as to the origin in the primitive breed of sheep. On this the Scriptures are silent. Of their form, however, they mention the ram was horned. The color, Dr. Shaw says, was tawny or dingy black. At the present, there is a tendency to return to the original hue. When Jacob hired himself to Laban for his daughter, a condition was that he should receive as his share of the sheep a certain color, and he obtained the color he wanted, I do not say by what means--whether by fright or by scientific breeding. We have several instances in the Bible that speak of sheep being white. But neither the history of man nor the zoölogical character of sheep are relative to our subject, and we only state that from the earliest period in the history of our inhabited earth sheep are, and always have been, essential to the wants and comfort of man, and yet the population of the world is more than double the whole number of sheep. We have many distinct breeds, and these may have sprung from the flock of

Abel. Sheep are found in all parts of the world. The United States stands fourth in point of numbers, having at the present day fifty millions three hundred and sixty thousand two hundred and forty-three, while the number last year exceeded this two hundred and sixty-six thousand three hundred and eighty-three. At what time sheep were introduced into the United States we have no means of knowing, but suppose they were brought from Europe by the colonists. Notwithstanding the large number we now have, we never have produced sufficient wool for home consumption.

Sheep-husbandry is an industry essential to the prosperity of our Nation in producing the flesh-food for the fifty-six millions of our people, as well as the wool to clothe them.

The profits of keeping sheep are derived from the wool, the carcass, the increase, and the fertilizing properties of their droppings, and, in some localities, in subduing in the fields and woodlands noxious weeds and briars, and also by their feeding and thriving on untillable hill-slopes, thus aiding in making every foot of land produce for the outlay.

The question is, what breed will give the largest return for the cost of keeping? Opinions of men differ, and they choose their favorite breeds. It is not our purpose to say in this essay which is best, but to make some suggestions or statements.

We remark that climate, soil, and locality must be well considered. Randall says: "In selecting a breed for any given locality, we are to take into consideration, first, the feed and climate, or the surrounding natural circumstances, and second, the market facilities and demand. We should then make choice of the breed which, with the advantages possessed, and under all circumstances, will yield the greatest net value of marketable products." It is true that competition in fruits and the dairy products on high-priced land, especially near cities, may kill out sheep-raising.

Many farmers, owing to their zeal and want of experience, without giving the business of sheep-raising due consideration, make a mistake in choosing a breed, and become discouraged and quit the business with a loss to themselves.

There is a tendency to breed larger sheep at present in order to increase the meat production, at the same time to keep up the intrinsic value of the fleece: therefore sheep that are likely to produce these results will be sought for.

Before speaking of the different breeds, I remark the owner or breeder must "look well to the state of his flock" if he would make sheep-raising profitable. If he has no experience, let him begin with very few, and give them good attention. Sheep will thrive by handling kindly and seeing them every day.

Whatever breed a man selects, they should be healthy, vigorous animals, of good size, clear azure eye, florid skin, healthy gums, and teeth fast, fine brisket, good bone, round-shaped barrel, all indicating health and activity,

There are, perhaps, over fifty distinct breeds of sheep; we will refer to only a few favorite ones.

Long-Wools.

The Cotswold is the best known in the United States, is bred principally for mutton; these grow up rapidly to a large size, and also give a large handsome fleece and are always fat, and if not too fat, are prolific breeders, their lambs are strong, and in a few months are ready for the market.

The Leicester is also a favorite breed; the wool is longer and opens nicely, is handsomer than the Cotswold fleece, having a beautiful crimp, but from my observation they are not so hardy. I have seen some that weighed nearly three hundred pounds, and Cotswolds have exceeded this weight.

The Lincolns, without doubt, produce the best wool of all long-wool breeds, and some place them first in point of merit where early maturity, size, quality of mutton, luster, weight of fleece, and length of staple are sought for. Of those I have handled I could not but admire the uniform size and make; these were a great improvement over many I have seen with lank, panther-like frame and long legs; for some reason this breed is not generally popular, yet they possess all the good points sought by breeders.

The Middle Wools.

The Southdown, sometimes called the Sussexdown, are remarkably active, always on the watch, with an intelligent look, of fine make, very hardy and docile, take on fat very readily and mature early; the wool is rather short and coarse. The fleece is the least source of profit; their mutton is the choicest. They are the most numerous of downs; as many as sixty will thrive in a herd, which is not the case with long-wools.

The blood of the Southdown and some of their good points enter largely into the make up of other downs, for this reason: they stand preëminently at the head of all the downs, always healthy and strong.

The Hampshiredown spring from a cross probably with the Cotswold in connection with the original Hampshire. These shear a large fleece, fatten quickly, and possess valuable points and are the favorites of many fine breeders.

The Oxforddowns are also a breed highly prized, large and well formed dark legs and faces, and show a tuft of wool on the forehead like the Cotswold. This breed has its origin from the Southdown crossed on the Oxfords in connection with the Cotswold. This breed, for length of staple and fine carcass, is becoming popular.

The Shropshiredown are large bodied, very handsome, and originated from a cross with the Southdown and some other black-faced sheep, in connection with long-wool breeds, Leicester or Cotswold. I have seen these so fat they were hardly able to rise from their beds, and weighed three hundred pounds. They are not so dark in the face and legs as the Southdown. Those who breed them represent their mutton equal to the Southdown. They have large fleeces.

The down breeds I have mentioned, as well as some other downs I have not mentioned, are now contesting their merits in the mutton markets with the delicious mutton of the Southdown. They all far surpass the Southdown in fleece.

I come now to speak of the Merino. The commercial value of the sheep in the United States is largely in favor of the Merino and their crosses. They produce the clothing and the delane wools and furnish the large bulk of the mutton in the markets, and outnumber all other breeds combined. They are the backbone of the wool-growing industry of the United States.

The Spanish or American Merino has, for nearly a half century, stood at the head of all breeds. It is almost incredible the weight of fleece they yield; it is not uncommon to find a whole flock averaging over twelve or fourteen pounds per fleece in the grease ; they have the "golden hoof."

A test of their mutton with other breeds was made at the late annual meeting at Beaver, of the State Wool-Growers' Association, and the one hundred judges who surrounded the table were unable to decide which was the best; all animals prepared for the occasion were juicy, sweet, and delicious.

When the fleece of this breed is very greasy, caused by abundant exudation and sometimes over-abundant exudation, such sheep require liberal feeding. The Merinos of the present day that are recognized as pure and line bred are registered in a book authorized by an association of breeders, of a distinct and separate variety, and the same may be said of the mutton breeds. Those who have kept stud flocks have had fine profits in supplying for breeding purposes, but that day of profit from this source alone will remain in the hands of only a few who will be obliged to sell at lower figures.

The Saxon Improved

produces the finest and best wool in the world. It sold last year at fifty-five cents per pound, brook-washed, averaging over four pounds. Their mutton is, perhaps, finer than the Southdown when ripe and well-fatted. We have also the Black-top Merino and the Delane Merino. These are large and smooth. Three old wethers average one hundred and thirty pounds; some individuals have weighed two hundred pounds. They are very hardy and yield large fleeces of very long staple (see samples) and are regarded as the largest Merino, yielding the largest fleece or amount of wool.

I have now named the leading breeds of our country, any of which are well adapted to the soil and climate of our State.

The farmer who would make the sheep industry pay will have difficulties to outlive and overcome. The first duty required of him is close attention and perseverance and indomitable energy. In handling sheep for profit, he must keep them in good condition and never over-stock.

The long-wools or the downs will be more desirable near cities, and will bring a good return from the meat product alone. The Southdown will do well in the mountain districts. The Merino will thrive on the hill-slopes and pasture-lands of the State, and do better if remote from the mining districts, where dogs abound. The enemy of sheep is the dog.

One of the surest plans for profit is to purchase good, strong, grade Merino ewes and cross them with a long-wool ram, feed them well and have the lambs come early; graze the ewes every fit day on a rye-field. Sell the lambs at four or five months old; they will bring high prices—over three dollars per head. The mothers will fatten in time for market, or, if retained to use for another crop of lambs, their wool ought to pay the cost of keeping. Very little risk is run in a trial of this kind with grade Merino ewes. Those who prefer the English or mutton breeds will always have a market for fat lambs and fat sheep.

There is another item I will mention—the cost of keeping, and will leave out the cost of the land and buildings. This will not seem to be much in summer, for sheep will do well on thickly-set short grass, and a variety of weeds and briars are chosen before the tame grass, but when we come to house them the cost increases. Taking hay as the standard by which the quantity of any daily food is determined, if we wish to grow nice wool, we must not increase the flesh and fat at the expense of the wool or any of its properties. As a general rule, the quantity fed should be in proportion to the live weight of the sheep. Matured, healthy animals always consume in the ratio of size. A sheep of seventy pounds live weight will require three pounds of hay daily and one pint of corn and oats mixed. This amount will keep a sheep in good, thriving condition, but when three or four pounds of potatoes and a quantity of cabbage leaves are fed, what they will eat, they will take on fat very readily. Some estimate two and one half pounds hay per day, and this amount, if good, with a daily ration of corn and oats, is sufficient for Merinos; Saxon Merinos require less feed than the other Merinos.

It is a nice question to determine how many pounds of wool and of wool and mutton combined can be raised off an acre of ground, and the cost will vary according as the price of feed varies. Experience is given by some who have tested their breed, but no competition test has been made of the different breeds.

We must bear in mind "that it requires an equal amount of food to produce a pound of flesh or a pound of wool without regard to the size of the sheep or the breed." If there is an exception to this rule, it is with the greasy Merino. To explain further: take a Southdown that weighs one hundred pounds; it will require three and one half pounds hay daily, while a Leicester that weighs one hundred and fifty pounds will require five pounds hay daily. These will be equally profitable. We find animals in flocks that outstrip others, and grow faster and larger and produce larger fleeces; others having the same chance make small growth. For want of time, I close, leaving this part of the subject of cost unfinished.

The subject having been declared open for discussion—

Mr. HOOVER. Some of the long-wools are troubled with the "snuffles;" is there any remedy?

JOHN McDOWELL of Washington. It is true that some of them have an exudation from the nose. I do not know of any remedy. but I think it is an excellent plan to card the wool once a month. If a sheep is unhealthy, I would feed it sulphur; three pounds of sulphur mixed with twelve pounds of salt is excellent, and, if given free access to it, they will not eat too much; by feeding this mixture constantly you will have much better luck with sheep.

The SECTETARY. Have you had any experience with "foot-rot?"

JOHN McDOWELL. I have had more than eight thousand sheep in a single year, and have had some experience with foot-rot. I have "footed" the sheep, but that is too expensive; I have taken soot from the chimney and putting it in leather or strong canvas sacks, have drawn it over the affected feet, but that, too, is too expensive and tedious. The following remedy is very popular, and has been sold for twenty dollars: Mix one pound of white lead, one ounce of calamine powder, and three ounces of antimony, or in that proportion. When the feet have been cleaned. apply with a swab or smooth flat stick; apply the ointment between the claws and rub them well together. If possible, keep them on clean sod for a while after the application. If there are maggots in the foot, use butter of antimony liberally; go over all of the sheep, whether affected or not; the mixture is a preventive, and when worn off should be renewed. The worst cases should be marked for another application before the whole of the flock will need it again. Two applications will usually cure even bad cases; the cost is about one cent per animal. One week should elapse between the first and second application, except in very bad cases, which will require it sooner, and should have three or four applications, if needed, to effect a cure.

J. G. ZERR of Berks. I have had some experience with foot-rot, and have found the following to be the most effective and economical mixture that I can use: Four parts of well-washed North Carolina tar, one part of rosin, and one of tallow; boil these three together until sufficiently thick to make it of the consistency of salve: one application will cure a bad case of foot-rot. This mixture should be kept on hand all the time; it is excellent for all wounds and bruises about the feet of any kind of animal.

FORESTRY AND ITS EFFECTS UPON THE FARMER.

By S. P. Eby, *of Lancaster, Pa.*

The effects and influences which forests and timber belts have upon farm crops and farming operations seem to be but little understood and still less regarded in this community.

Our farmers thus far appear to have considered only one class of facts. For as much as farm crops and forest trees cannot be successfully grown together in the same field rows, because oaks will not bear corn and vegetables, and because no one has yet learned to graft upon the branches of the trees in the woods foliage that will sell for seed-leaf tobacco or that can be manufactured into fragrent havanas, the best and only thing for the farmers to do is to clear the land of all trees by which it is encumbered. This seems to be the argument and conclusion. Accordingly, the axe, and saw, and fire-brand have been let loose among our forests, and their destruction has been going on without limit and without discrimination for over a century.

Regardless whether the land, after it was cleared, could be successfully cultivated, mountain heights and hill-sides have been laid bleak and bare, and the steep banks along many of our streams, where the soil was only held in place by the roots of trees that struggled for a foot-hold, place where cattle cannot safely venture to browse if perchance grass would grow, and where plow can never draw a furrow, have been made barren only to be torn by the elements into dangerous, unsightly, and constantly increasing gullies that fill the streams below with their washings.

Forests being removed with much labor and expense, so that not even a tree on the outskirts can send its roots into the fields to drink the substance of the soil, or cast its baleful shadows over the ground, the farmer considers himself assured of full crops and believes surely his fortune is ripening.

Let us notice what follows :

He finds before long that the spring that used to flow through, his lower fields at which the cattle used to drink has gone dry. That the one under the spring-house gets much lower in dry seasons and loses itself in the now plowed up meadow a short distance below. He consoles himself, however, that he is no worse off than his neighbors, some of whose springs have also failed, or who had to deepen their wells, or who had been forced to depend altogether on cistern water for their cattle. He finds also that the winds blow harder and sharper around his buildings and over his fields, that the temperature changes more quickly, and that cold snaps or hot days come and go more suddenly as the winds shift to the north or south. He also notices, (perhaps congratulates himself upon it) that those long, lingering, misty, drizzling, rainy spells of weather that used to come when he was a boy and lasted sometimes for weeks, so that the hay could scarcely be made and the grain sprouted in the shocks, did not of late years return. Consequently, he is forced to admit to himself that moisture has become reduced. He also notices that the old orchard is beginning to feel the effects of it and that the young orchard does not seem to thrive. Apples they used to have by the wagon-load, more than they could use, and he wonders perhaps what can be the cause of the change, but satisfies himself that the seasons have been unusually dry the past few years, notwithstanding that there had been some pouring rains that washed the fields badly, but then the high winds that followed soon dried everything again. Thus the matter may be accounted for and the answer accepted for want of a better one, why the trees in his young orchard appear dry and sapless, with large cracks in the bark and borers in their trunks.

The wheat-crop not paying very well, he is induced to try the raising of tobacco; a small patch, at first, which proves a success. Being a late crop, it generally receives the after-harvest rains, which seem now more certain to come than those in the early part of the summer. So he plants more tobacco, builds himself a large shed in which to cure it, and considers himself happy. But he finds that while man proposes, the circumstances by which he is surrounded very often *dispose*.

The numerous belts of forests that crowned the hills and fringed the streams when he was a boy, that wooed the rain-fall to the earth in gentle showers, being removed, the clouds seem to feel their absence, storm angrily over the landscape and smite the tobacco-field again and again with such hail-stones as were never before seen.

So his enterprising neighbors organize a hail insurance company, which does a thriving business. He becomes a member, and once more considers himself safe beyond peradventure of his crop. He finds, however, that Nature's laws cannot be violated with impunity, and that the penalty will be exacted beyond the ingenuity of man to escape.

The next crop of tobacco happens to be in the meadow, whose rich old sod has been plowed down for that purpose, and the crop promises well. Besides, it is now insured against hail. One night, however, there comes a great rain that floods the meadow, and the next morning the tobacco and soil have been washed away together, down to hard-pan.

A fine grove of forest trees that had escaped the axe stood a few hundred yards east of an old homestead in the county of Lancaster. Its stone walls had withstood the tempests, keeping its inmates dry and warm for over three quarters of a century. The grove was cut down, and now the east wind, having a full sweep, drives the rain through to the inside. In many places in the same county can be seen stone and brick houses weather-boarded for this reason.

The steam-engines that now puff at almost every grist mill in that and other counties to supply the lost water-power is an emphatic declaration that the streams are fast getting lower.

One trouble is that the people of many communities in this State have not yet learned that woodlands are not public property, and they act accordingly. If a neighbor's wife needs pea-brushes or bean-poles, she thinks it no harm to send her boys to the woods to get them, and will ask for permission the first time she meets the owner, if she does not forget it. The leaves in the woods are raked together and hauled away to bed a neighbor's cow or pigs, without leave or license, and without the thought of committing a trespass, and the wood-mold, being the richest portion of the soil, gradually finds its way into the flower-beds within several miles around. If a runaway swarm of bees unfortunately selects one of the trees for a hive, it is sure to come down, no matter how valuable the tree itself or how many others it crushes in its fall.

The assessor of taxes, particularly, has an evil eye on the remaining strips of forest, and taxes them with a vengeance. Should the owner object or complain of any of these depredations, he is looked upon as a mean, selfish, and unreasonable person, without any charity towards his neighbors or generosity in his heart. So the owner, who would be willing to spare his woodland yet a little while, is at last driven in utter despair to send for the executioner with his portable steam saw-mill, and the forest goes down to the grating sound of the buzz-saw and the triumphant scream of the steam-whistle.

I have thus endeavored to state some of the evil effects which the sweeping and indiscriminate destruction of the forests has brought upon our farmers and their crops, which may be briefly recapitulated, as follows:

1. The great decrease in the moisture of the atmosphere necessary for the growth of vegetation.
2. The increased suddenness of changes in temperature and uncertainty of climate.
3. The increased force of the winds, stunting vegetation and blasting crops and fruit-trees.
4. The deprivation of wholesome drinking water for man and beast.
5. Permanent loss of soil by washings in heavy rains.

The object of forestry is to awaken an interest and teach the people, and the farmers particularly, the necessity of re-foresting a certain portion of their lands; how, when, and where to plant trees, what kinds are best, and the profits that can be realized from growing timber, and the still greater benefit the cultivated portion of the farm will receive from the protection which the newly-planted woods will give. Should any one doubt the truth of the statements here made, we can inform him that there is abundant proof at hand to substantiate all that has been asserted.

In this country, which is yet comparatively inexperienced in this matter, it is, nevertheless, noticed that certain effects invariably follow the clearing away of the woods. In the older countries of Europe, with a riper experience. it has been observed, not only that similar effects have followed the cutting away of the forests, but also that, upon the forests having been replanted, the evil effects have disappeared; springs have resumed their flow with former volume, and things returned to their previous normal condition in rain-fall, climate, and productiveness. So that the relation of the cause and the effect has, in this respect, been established beyond a doubt.

We may further say that, where the destruction of the forests in the old countries has been persisted in, without any replanting, the consequences have been most disastrous. We are told of vast tracts of country in Africa and Asia that were once wooded and covered with vegetation, intersected by flowing streams of water, and supporting a numerous population. Over these tracts the forests were all destroyed and never replanted, and the lands became uninhabitable deserts and remain so to this day. The ridges upon which the forests once stood are now bare of vegetation, and the dry, rocky channels through which the rivers once flowed are still there, but everything that makes life possible has disappeared.

So direful is the curse which man has brought upon those lands and so fearful the lesson of what other peoples must expect if greed for present riches is allowed to carry away their better judgment in the more moderate use of the good things the earth affords.

The gifted poet, who, "in the love of Nature, held communion with her visible forms and knew her various language," standing upon the blackened hillside where the smoke of the burning forest was going up, a costly but unsanctified sacrifice, invoking the spirit of the departed Red-man, pronounces through his lips this prophetic warning:

"But I behold a fearful sign,
To which the white men's eyes are blind;
Their race may vanish hence, like mine,
And leave no trace behind,
Save ruins o'er the region spread,
And the white stones above the dead.

"Before these fields were shorn and tilled,
Full to the brim our rivers flowed;
The melody of waters filled
The fresh and boundless wood;
And torrents dashed and rivulets played,
And fountains spouted in the shade.

"Those grateful sounds are heard no more,
The springs are silent in the sun;
The rivers, by the blackened shore,
With lessening current run;
The realm our tribes are crushed to get
May be a barren desert yet."

The subject being open for discussion—

Dr. E. HARVEY of Delaware. Mr. President: I cannot doubt that the cutting away of the timber has lessened the rain-fall. Our streams are smaller—they grow smaller, gradually, as the timber is cut away. Now, here is a positive fact, in proof of this: About Salt Lake City, in Utah, where they formerly suffered for the want of rain, having few or no trees, they now have sufficient rains to keep the grass-crop growing all summer. When the Mormons settled there, they irrigated the land from the running streams along the mountains, and through the city of Salt Lake, through every street, there is running water, and all along there is vegetation. They have a rain-fall every year sufficient to keep the grass green. I understand how this can be, I think. We have a dry spell, and have had some dry spells this summer. The ground parches with heat; there is no grass upon it. Where the sun shines upon the living grass, you put your hand upon the grass and it is cool. It is where it is cool that the sun-heat and the sunlight have been expended upon that grass, making it grow. It cannot grow without them; it ceases to grow without heat and light. All these particles of matter are convertible into each other; there is a co-relation between these forces. The heat and light are used up in this grass by its growing. When the air becomes so hot and the sunlight so intense that the grass cannot grow, then the ground becomes hot; the whole country is dried and hot—it is like passing a stove; the effect is just the same—and it all gets dry. You see the lightning or hear the thunder in the day-time, and when it is no longer heard you say it has gone around. The fact is, it has dissolved in the air. It rained until it came to the dry spell, and it dried up and you get no rain until along in the cool weather, until it seems that a thunder-cloud spreads over a hundred miles, and then all alike. In our country all dries up at once. We have less rain-fall, because the ground gets so hot. If a larger proportion of the ground is covered with forests, there is not enough heated ground to prevent the rain-fall, and when it rains the grass keeps green. When it gets just past that the grass cannot grow, then you have a dry spell. We have less rain-fall, undoubtedly, than formerly. What is deplorable, it rains as much as it used to in the winter, but in the summer, when the crops grow, there is not so much. If it never would get so dry as to prevent the grass growing, we would have a sufficient quantity of rain-fall.

Secretary Edge. Is there any positive evidence or proof than the annual rain-fall in Pennsylvania has actually decreased?

Dr. E. Harvey. I think so.

Secretary Edge. I have hunted for the evidence a good while, but have never been able to find it.

Dr. E. Harvey. The Brandywine proves that.

Secretary Edge. Is it not possible that, instead of coming down more regularly, the rain-fall now comes down all at once? Does not the amount of water in the Brandywine *average* as much *per year* as ever it did?

Dr. Harvey. I think not. I remember a great walnut post, and a ring on the tree on the other side, where a rope was stretched across for ferrying in high water, and the people with wagons forded across it at other seasons of the year. For a number of years, both are away from the water, and there is never that much water there any more. When the British came to the Brandywine at Chadd's Ford, they found difficulty in crossing. At my grandfather's place, the stream was broad and rapid; but they forded it, and it was as much as they could do to cross. Yet I could wade across there when a boy. The battle was fought in September, and the streams are low in September every year. However, I speak positively only of the Brandywine, with which I am familiar all my life; and I am familiar with that all through our country. There also runs down to the river the Cobb's creek, as well as the Brandywine. I think, with Philadelphia county on the east, first comes Darby creek, then Crum creek, Chester creek, Naaman's creek, and all these ran to the Delaware, and factories were built upon them with water-power. Now, they have thrown the wheels out entirely and have steam in them. There is not enough water to use water-power. These factories remain there because they are planted there, with a railroad from Philadelphia running there to bring the raw material--such as cotton—and take it away, and is a good place for railroads, without reference to water-power.

Secretary Edge. Is it not possible that the Mormons destroyed five trees for every one planted?

Dr. E. Harvey. I do not think so. A gentleman informed me that the change is clearly due to the vegetation there making rain-fall. He said when the older settlers were first there, there were no green trees, and there was no green grass growing there, except on some streams running down from the mountain. They turned out the streams so as to irrigate the land. The Mormons divided up the town and country into lots of different sizes. In Salt Lake City they made the lots small, and then made others larger, and others still larger, and any man could take a piece of land as long as he attended to it, but when he ceased to use it, it was assigned to somebody else. It was the very best agrarian law ever made. They had some box-elder along the streams; they seemed to know all about it.

In regard to the diminished flow of the Brandywine, we have still other proofs. During the summer, when the dams hold the water over Sunday, and the water has not got down until about noon on Monday, the stream is nearly empty, and the fish have to seek the deep holes to subsist in it. That was not so when we had forests there. Then we had no ford, we had to ferry.

J. B. Smith of Luzerne. The Doctor spoke about the territory adjoining Colorado. They told me there last year, when I was out this side of Denver, that the more they plowed and cultivated, the more rain they got every season; and that the land this side of Denver, perhaps fifteen miles, had no plowing done on it at all; and now they have commenced plowing and cultivating.

Dr. E. HARVEY. Do they irrigate the land?

J. B. SMITH. Yes, they have been irrigating the land. I received a letter some time ago stating that they had several rain storms in the month of September, and they said they could plow. It had not been known for twenty years that they could plow in that month. It seems the more they plow, the more rain they get. There is no timber there except on the mountains.

M. W. OLIVER of Crawford. How does the Doctor reconcile his theory or experience in Delaware county with the fact that in Kansas, where they do not practice irrigation, the more the ground is cultivated the more the rain-fall is increased?

Dr. E. HARVEY. I do not know enough about the land of Kansas to give an intelligent answer. I do not know the condition of the land there, and the kind of vegetation upon it. Perhaps it was covered with a thin coat of sage, which did not prevent it getting hot, and when they covered the ground with something that kept it cool, they got more rain.

Col. WILLIAM GATES of Venango. I have read a great deal on the subject of forestry. You have to pay more attention to that in the eastern part of the State than we in the western part. Our old forests are nearly all cut off, but we have plenty of new timber. To be sure we have some old, but a great deal of it was injured by the fires, the butts being rotten and the tops dying. I believe there is as much rain-fall with us now as ever there was. Our rain-falls come very violently. With no obstruction, or with no more than anywhere else, the fields are covered very quickly and floods are very damaging. The water escapes and leaves us immediately after rain. The wind veers around to the west, and from there to the north, and we get a strong wind, and that dries up the moisture. There are no logs lying through the woods to prevent the water escaping. It runs off, and consequently the ground soon dries up again. We have had for three years in succession an unusual quantity of rain-fall. I have been west annually for five years past, and away out in the West, where they thought it never would come, they have an abundance of rain—away beyond Kansas and Nebraska, clear through to Denver, in Colorado. I have no doubt that they are going to get all the rain any country need expect to get by not cutting the timber. They obtain moisture, and it does not absorb so rapidly. It seems as if, by the cutting of the larger timber, the water flows more rapidly and makes great floods, and tears everything to pieces in its way. So, if we get a north-east storm, as we do for a few hours, and a north-west wind sets in and dries everything up, no gradual evaporation takes place, for it is the wind that does the mischief for us. So far as the rain-fall is concerned, I believe we are having as much rain-fall as we ever had.

S. P. EBY of Lancaster. I would like to ask Mr. Gates whether he has not read the fact that the people have planted trees in the Western States by the thousands. They have had Arbor days longer than we have had, and a person who selects a place and plants and grows trees is rewarded therefor. They grow a number of varieties, but none seem to grow as fast as the cotton wood tree. It is a disputed point whether the rain-fall is less than a few years ago. Mr. Meehan and Secretary Edge say that the rain-fall is the same, but that the rain is not distributed as equally as it formerly was—there is nothing to hold it when it does fall and it is swept away.

Hills that are covered with a thick growth of timber help to retain the rainfall and the snow, by holding it on the ground and it gradually passes away. The moisture was such as to hold the streams all through the summer. Go along a railroad now and stand there when there is a thaw or a heavy rain, and see the water coming down there sufficient to drive a mill-wheel, which, if kept back and gradually flowed along, might be enough to keep up a supply all the year. That is the difference. All of us must have observed in dry weather when we have these local rains, as we call them, that they are very apt to follow in the same course. If a shower has gone through a country, moistening it, sometimes you see that those people in the dry part think they are not worthy any more to receive rains. I have noticed storms go on the one side of the river, gather on the York county hills, for instance, and with a wind to carry them across to this county in very hot weather; yet when they approached the river they stopped. The heat on these cultivated fields at that time, in the middle of the day, was such that when you looked over them you could see it "shimmer," as though from a hot stove. When the rain-storm approached it, it created a body of cold air, and here is a body of very warm or hot air. This created a draft at once, as when you open a door a current of hot air will pass the cold air above and below. I have stood in that draft; I have felt the cold rain-shower coming, from the cold air, and have seen the storm pass down the river after coming in this direction. There was a corresponding current in the upper atmosphere just the other way, and, consequently, the rain-storm could not enter, because the current was against it, and it would pass on down where the trees and moisture were enough to attract it. The same day I noticed a rain-storm gather so large and wide it could not escape. It divided, and the clouds, as they came just over this heated locality, dried away. The rain actually fell, and a few drops came down to the ground, but quickly vanished. That is nothing new. That is what writers and observers say they have witnessed on the prairies—that the rain-clouds passed over the prairies and emptied themselves out in the districts where there were forests; that as soon as they came out near the prairies the hot air dried them up—that they have seen the rain-drops fall and dry before striking the ground.

When we have an eastern rain, and the whole country is blown over, there is no counter current. We still get the eastern rains, but the local rains, when we get them, they pass the cultivated part of the districts, and follow the mountains or the streams where there is some timber left.

Now, there are many facts, in France, Germany, and everywhere they have tried experimentally and from experience, and the same effects follow the same causes. Where the forests were cut away the springs dried up, and the storms were more violent, washing down the hill-sides. They replanted them, and, to the great surprise and astonishment of the inhabitants, the springs re-appeared, and the country was restored to its normal condition.

Hon. C. C. **Musselman** of Somerset. I feel like bearing testimony to the remarks which we have just heard. I am from a mountain district, and I know that these rains take a certain course along the mountain ranges and along the streams where there is moisture; so much so that there is a man living among us who follows his profanity by saying that "the people who pay no taxes get the most rain." [Laughter.]

Then again, there are our locomotives sowing broadcast fire and destruction over so much of our country. A man going out and picking huckleberries sets fire to some brush, which communicates to our woods, and whole forests are burned down. Last year, through the carelessness of a boy of a neighbor, twenty acres of my best woodland were consumed. I believe in an ounce of prevention rather than a pound of cure, and I bought a number of acres of forest land that was newly cut off. It already has growths on as thick as my wrist, chestnut and oak. The planting of trees in this country is too slow a process, and this thing of trying to make out that our interfering with the laws of nature continually has nothing to do with the elements is a mistake. We are continually interfering with these laws. It is a wonder we are not entirely dried up. We know these rains are being drawn by the forests and streams—that they follow along the forests and rivers—and that where they have plenty of trees, there they have plenty of rain.

S. P. EBY. Some crops are now found to do better than formerly. Other crops that did very well once do not do very well now; for instance, the apple crop. Some few years ago there was a great deal of alarm about the wheat crop, and it did not do very well. All sorts of reasons were given for it, and some thought that the substances that produce wheat had all been taken out of the land. But last year and year before last they still produced wheat. Although we do not attend agricultural meetings very much, we still seem to be a sort of agricultural people in Lancaster county, and we are trying to adapt our lands to those crops that can be best raised. It has been found that tobacco can be raised better than anything else.

D. H. FORESMAN of Lycoming. Is it not notorious that Lancaster county has been a wheat-producing county for a hundred years? Does not the record show that the products of Lancaster county are larger than those elsewhere?

S. P. EBY. Apples do not seem to do well, except in some few localities. When I see a man bring apples to market, I ask where they were raised. I found, in one case, they were protected by a double row of locust trees; and I found a man had grown apples on the north side of his woods, and he has had apples there for many years. The woods were cut away, and he has had very few apples since—showing that where the wood is cut away apples do not grow so well. With the forests away, the wheat does not do so well, and even clover freezes out.

Prof. D. WILSON of Juniata. I would like to state a fact, which, I think, will bear on this subject of rain-fall in Pennsylvania. There is in Juniata county a stream called the Licking creek, about thirty miles long, and walled on each side by a high mountain, with many streams flowing into it. I have known that stream forty years, personally, and by history about seventy years. It was girted by a dense forest at one time. The valley will not average more than a mile and a half in width. It used to be a famous place for hunting bears and wolves, and it is still a good place for deer. I know of the time when there were a number of mills along that stream. One of these mills is as good a mill as any in the county. Unfortunately, they bought a steam saw-mill and got to cutting the timber there. But before introducing the saw-mill, there was a company formed, which expected to get rich by floating the wood down the stream. By the time these men had used the oak timber, this stream began to fail and the company broke up. A tanning factory had to give up business, because of the want of bark, but particularly for the want of water. The saw-mill company broke up, because of want of water. The three flouring mills that used to grind entirely by water cannot find enough water to do the custom grinding near home. They have built higher and better dams to catch the water. Now, the fact is that the two sides of the mountains—the north side of the one and the south side of the other—being stripped largely of their forests, especially of the heavy timber, the streams have failed. It empties into the Juniata river within half a mile from where I live.

Now, there can be no question at all about that fact, that the water has failed there, or failed to a very great degree within forty years. We have plenty of water in the spring, when the mountains are covered with snow, but we have not higher floods. In all my time, I know of but one flood three feet higher than one thirty-three years ago. In summer time we have frequent rains, but it is a rare thing that this creek rises to a very considerable height.

S. P. EBY. It seems to me plain we have less rain-fall in this country than formerly. The great American desert receives a supply, which it did not receive a few years ago. It gets a greater supply of water from the air. This friend of mine who has bought this timber-land is going to get this condensation. Those hot fields cause volatilization, and the rain-fall comes again by condensation. It is just as plain and simple, when we come to remember what the rain is and how it is produced, as many other subjects, and how the water-supply is produced. It is plain we can have as much rain here, when this plan is followed closely, as they can anywhere else.

L. S. REIST, of Lancaster county. I think it is evident that the water does not lay so near the surface. In my neighborhood we have to dig deeper for water, and I find a great many of our wells have become dry where we had plenty of water for many years. There are two engines continually employed in our part of the county making old wells deeper. I think that is evidence that the water lays deeper. About rain-fall, I recollect back, and for forty years the rains have been more regular. Speaking about settled rains, I know we have had settled rains that would last one whole week. I know in 1838 the sun shone only several times for two weeks. Now within the last ten years we have had a good deal of rain, but the rains were not regular. About ten years ago we had a rain that carried timber into the Conestoga—tops of trees a distance of two miles--swept everything, including all the fences, down to the Conestoga. There is more washing of the hill-sides. Land that is a little wet now and then has channels like the races of mills.

NOTE BY THE SECRETARY.—At different times during the existence of the Board, more or less attention has been given to the question of the effect of forests upon climate and rain fall; and while we do not claim that the conclusions reached are conclusive or free from error, yet we give them with considerable confidence, as follows:

First—That we have no evidence to prove any material change in our *average* annual rain fall. It is true that years may be selected during which our rain-fall has been light; but on the other hand, and with equal fairness, we may select years in which the rain-fall has exceeded the average, and has exceeded that of many other years; but if we divide past records into periods of ten years each, we believe that the difference will not be material.

Second—That forests influence the distribution of the rain-fall by affecting its location, and, after the rain-fall, by affecting its distribution. Forests, by their moist soil and shaded surface, hold the rain-fall and give it out to the springs and water-courses very gradually. By this shade they also prevent or retard excessive evaporation, which takes place from a bare and exposed soil. In winter the forests hold the snow, and, by protecting it from the direct rays of the sun and from warm winds, give the water to the streams much more gradually than now. In countries well covered by forests, the springs will show a much more regular discharge than in those not so protected, but the average rain-fall of the two may not vary one inch per year.

Third—That forests, by presenting areas of cool surface and cool soil, may "attract" the moisture and cause the precipitation of rain-fall which otherwise would have been dissipated by the heat of both soil and air; that for this reason local storms are usually found to follow streams, and that after—from its extended area—a storm has moistened a given section of country, other storms are apt to follow in the same course. Thus we often have one locality (as during the past season) saturated, while another is suffering for its share, which, in case of a forest covering, would have fallen on it.

Fourth—That very nearly or quite as much water passes down our main water-courses in the course of a year as formerly, but that it is much more irregular than then, and much more liable to sudden variations in amount; that on hill-sides and valleys denuded of trees, and not covered by heavy growths of grass, there is an increased amount of moisture lost by evaporation, which, of course, does not find its way into the streams, but which again falls elsewhere in the form of rain; that if some plan were devised to collect and retain the annual rain-fall of our streams, and protect it from additional loss by evaporation, giving it to our mill-dams in a regular supply throughout the whole year, we would find our water powers quite as reliable and valuable as formerly; that the only loss sustained by the actual rain-fall, as it is shown by our streams, is that caused by the more rapid evaporation from the exposed surface of the soil.

NATIVES, GRADES, AND THOROUGHBREDS FOR THE AVERAGE FARMER.

By N. F. UNDERWOOD, *Member from Wayne.*

In what we shall attempt to say under the above caption, reference will be had only to the bovine race, though many things which might be said of them would be equally applicable to other classes of domestic animals.

The past ten years has been a period of unprecedented activity in the importation to the United States, and the breeding and rearing here, of what are known as thoroughbred cattle. Nor has this unusual activity in this country been without its reflex effect in Great Britain and upon the Continent, for in that time animals imported here at high prices have recrossed the ocean at advanced figures, while the progeny of these imported animals, bred and reared in this country, have been exported to England to grace the herds of famous breeders of fine stock. That this continued infusion of new bovine blood, amounting to some thousands of selected animals in each year and the number still annually increasing, has had a most stimulating, not to say beneficial, effect upon the live-stock interests of the country is a fact too well known to be gainsaid. It may well be asked, however. whether, at the present time, the term "imported" does not stand for more than it is worth. While this stimulating effect has, in the Western States, been mainly in the direction of increased beef production and adding to the weight of the individual animal, it has, in the more eastern portion of our country, resulted in a before unheard-of development in the capacity of dairy cows. The extraordinary results of some of the tests which have been made in the production of milk and butter have been, and still are, regarded as phenomenal, compared with what was previously considered as the limit of production. As a matter of course, the extraordinary animals, bought and sold at extravagant prices, are mainly in the hands of men who, in point of financial ability, are far above the average farmer, the prices of even fairly good animals, of the leading breeds, being to him well-nigh prohibitory. By the term "average farmer" we mean the farmer of average means, who, perhaps, owns the farm he occupies-- one who acts upon the old adage, "He who by the plow would thrive," must have a practical acquaintance with the plow-handles himself, which, if it does not rhyme, expresses the idea, the plowman of the period not needing a driver--who does not do his farming entirely by proxy, and whose excess of income, after paying his expenses, taxes, and the thousand and one other demands upon his liberality, his charity, his hospitality, and last, but perhaps not least, his credulity, hardly requires three figures to enumerate it. As we have said, he does not own the cows with famous records, nor even their distant relatives of the same blood, but he has heard of them and of their wonderful yields, and as we shall insist that the average farmer is a progressive one, he is considering the matter of the improvement of his stock, and is casting about for ways and means whereby he may become the possessor of something approaching in excellence the best of those superior animals whose records have gained for them and their owners a such world-wide notoriety.

To the man of abundant means, the expenditure of a few hundreds, or thousands of dollars, as taste or fancy may dictate, is a matter of but little importance, whether the venture prove profitable or not; but to the average farmer the venturing of even small amounts upon uncertain chances is one of the things to be carefully avoided. The maxim, "Get the best," is by common consent a sound one, and as applicable to the farmer, in his business operations, as to any other; but in his case the important question is, what is the best for him, under the circumstances? He has his tastes and preferences, his ideas of form and color and comeliness, but these must be subordinated to the one main consideration of utility and profitableness. He must look at this question, not with the eye of a breeder of fancy stock, but as a producer of milk, butter, cheese, and meat, to be sold in the market. Thus his domestic animals must be selected, not for their beauty, or uniformity, or high breeding, but for the amount of money they will return him over and above their cost and keeping. His flock of cows consists at present of what are called natives, a term which, though in common use, is a difficult one to define. For our present purpose, it is sufficient to say the native cow is the common cow of the country—a mixture, perhaps, of several or many breeds, but possessing the distinguishing characteristics of none. Motley in color, variable in size, unlike and unsymmetrical in form. Possessing many good qualities along with some undesirable ones, yet not to be depended upon to transmit her own good points to her offspring. Some valuable and profitable animals will be found in the flock, but as a whole they are not satisfactory to their owner. He may weed out some of the poorer ones, and buy or breed others in their stead, and every dairyman knows how much of care and watchfulness are constantly required to keep a herd of cows of any breed, or no breed, up to a profitable standard; but he desires to change the whole business, as the current phrase expresses it, and has, perhaps, already decided upon the particular breed which would furnish him just the style of cow he needs, a point not always easy to decide, even where one has some knowledge of the claims of the different breeds. As for changing at once from natives to thoroughbreds, the thing is impracticable for the farmer of average means. If he is keeping ten cows upon his place, he may realize fifty dollars each, or five hundred dollars from the sale of them. With this amount, he may be able to buy two yearling thoroughbred heifers, or one older cow and a calf. Unless he has some ready money saved up, or becomes a borrower to restock his farm, he will be practically without stock, and in the same ratio short of manure for a number of years. It may be said that the natural increase of a few animals will soon provide all the stock his place can carry. This may be so, but the experience of many has been to the contrary. Thoroughbred cows, especially in the hands of beginners, seem to have a predominant tendency to bring forth male calves. The writer knows of one instance where, the present season, a herd of six cows and heifers brought forth five calves, four of which were bulls, and one still-born heifer. Such a condition of things may be all right for the production of grades, but the flock of thoroughbred females increases discouragingly slow under it. Considering the difference in cost between the native and the thoroughbred, it is not difficult to see that, even if the change were made without unduly burdening the owner of the herd, a greater or less change in the character of his business would become necessary. He could not expect increased butter and milk production in the ratio of the increased cost of his new herd. He undoubtedly would find the breeding and sale of stock more profitable than the production of butter and cheese, for a time, but the ultimate test of the merits and value of the two classes of animals, when the numbers of the thoroughbreds increase, and the average prices decline, must be a comparison of their practical productive capacity, under similar conditions. At the present time, and under present conditions, an attempt to compare the native with the thoroughbred would be a most difficult undertaking. In fact, no just comparison between the two classes is possible without reversing the conditions by which each is surrounded, and the treatment they are accustomed to receive. Take, for instance, the matter of rearing calves. The native is expected to remain upon the farm, to be useful there, to produce more than it consumes, to bear the yoke, or yield a goodly supply of milk, or lay on flesh and fat—in short, in a practical way, to become a source of profit to its owner. The thoroughbred is expected to go out in the world, to grace the show-pen and the prize-ring; to look sleek and fat and in good form, so as to catch the eye of some fancy breeder, and be transferred to him at a fancy price. The native is treated to whey, or skimmed milk, is turned out to graze upon short herbage at the age of a few weeks; exposed, perhaps, to storms, without shelter; to the mid-day sun, without shade, and to the plague of flies in mid summer. If it survives until autumn, it is well. If it succumbs to such treatment, it is just as well, but it never was worth raising. Late in autumn it is somehow persuaded to the barn or shed, and is inducted into the mysteries of grinding dry hay for a living, and if it shows an aptitude for the business, it is kept at it until spring. No grain, no currying, no coddling must be allowed, for is not hardiness the most valuable characteristic in a dairy cow, or fattening steer? What breed of thoroughbreds could survive for a year under such treatment, and enter upon the second year's growth with a hide upon their backs? But the thoroughbred is too valuable to be exposed to any such risks. New milk, fresh from the cow, in generous quantities, constitutes its diet for the first five or six months. As soon as possible, it must be taught to lick a little wheat middlings, or other nourishing grain food, and to nibble some freshly cut grass or clover, in its cosy box-stall in the barn basement, for the poor thing must not be worried by flies, nor scorched by the heat, nor pelted with rain or hail, until the cool autumn days come, when it can gradually be taught to crop the fresh grass in some carefully saved field, for a few hours during the day, and be returned to its snug quarters in the stable at night, where it can, in the meantime, be learning to eat some early cut hay, a little linseed meal, and a few nourishing roots, while during the winter there must be a daily application of the card and brush to keep its coat sleek and its skin comfortable. In the case of the older animals, the difference in treatment is but little less marked. Perhaps this statement of the case represents the two extremes of the treatment; but the idea has somehow become prevalent that it does not pay to treat the native too generously, and that it does not do to neglect the thoroughbred. To the average farmer, it is not the increased cost of keeping which would be necessary should he replace his present stock with herd-book animals, which deters him from making the exchange. He would accept that as a necessary part of the new order of things, if he could manage the matter of first cost. Failing to accomplish this in a satisfactory way, it has occurred to many that between their hardy, but comparatively unproductive, native cows, accustomed to coarse rations and indifferent care, and the costly imported animals, used to full feed and careful tending, there is a middle ground, wherein improvement may be made and the productive capacity increased, in a way both practicable and profitable. If the dairyman or the farmer cannot at once become the possessor of his ideal cow, he may commence to work towards the accomplishment of that object. If he cannot own full-blooded cows, of uniform color, size, and form, with grand escutcheons and way-up milk and butter records, he can, by grading up from selected native cows, by the use of a thoroughbred male of the desired breed, soon accumulate a herd which, in point of appearance and productiveness, will come little short of registered animals. In this way he may combine the good qualities of both—the hardiness of the one with the form, color, and capacity of the other—the result a really superior cow for practical use. In many of the best dairy districts of this and other States, fine herds of grade Ayrshires, Jerseys, &c., attest the feasibility and profitableness of this plan of improvement. We do not offer it as a thing at all original, but simply as a plan which has worked so well as to be worthy of a more general adoption. While the demand for registered cows and heifers seems to keep pace with the supply, and prices are well maintained, it is no secret that good registered bulls, of nearly all the leading breeds, are frequently offered at prices within the reach of even farmers of moderate means. Where two or more contiguous farmers unite in the purchase of such an animal, the cost will be small to each, and soon the whole dairy stock of a neighborhood may be on the high road to improvement. In addition to this improved blood, they would also be likely to adopt the system of more generous feeding and careful attendance, and thus a two-fold advance would be made in the right direction. In spite of all that has been said and written about pampering and forcing the imported cow, her introduction here is teaching our people that there is both pleasure and profit in liberal treatment to every owner of a cow that is worth feeding at all. While it would seem that, for the class of farmers of whom we have been speaking, a judicious grading of their stock offered the most feasible means at hand for present improvement, we would by no means have them abandon the idea of owning a herd of thoroughbreds. The coming cow is undoubtedly a pure-blooded and registered animal, and the man who has made up his mind that he will have a herd of that stamp is going to succeed in it, if he only possesses the qualities of patience and persistence. His own judgment and his own market must guide him as to the particular breed best suited to his purpose. Certain it is that while the claim is made for many that they are best, no unanimous verdict can be obtained in favor of any, and it is by no means settled that, given an equal show in the matter of food and care, the despised native would stand at the foot of the list.

WHAT IS A FARMER?

By M. W. OLIVER, *Member from Crawford.*

A man living on a farm, plowing a few acres of ground, and keeping some stock, is called a farmer. With no previous training for the business, and never having read much about it, yet a great many have assumed that "it is no trick to be a farmer," and so, pursuing the business blindly, they call it good luck when they succeed and bad luck when they fail.

Such have failed to apprehend the fact that in all the walks of life, in whatever calling we may engage, there is a necessity of fitness, or failure is almost sure to attend.

Did ever a man succeed in his profession without much study? The lawyer has his library, for he must not only be posted in what "the code" says, but must keep himself posted in the laws which Congress and his State Legislature may enact. The doctor, after years of study and attending courses of lectures, must have his books and medical journals at hand and must read and study them, and he finds to the end of his life that there is still something to learn. No lawyer or doctor more needs a course of study and reading than the farmer. The soil he tills is a study fully as intricate and interesting as Blackstone. The best manner to improve his farm and his stock is another study, and so in all the details of his farm operations. Success in any department requires study.

Man, as God's vicegerent on earth, has many duties to perform. One of his chief responsibilities is to cause the soil to yield in fullness the blessings it is capable of bestowing. It is his privilege to draw without restraint from its fruitfulness, and it is incumbent upon him to return with interest the benefits he receives. No matter from what sources or from what causes extraordinary exertion is made necessary on his part to meet the situation, no excuse, according to divine and natural laws, can be made to relieve him from the effort to maintain the wonted fertility of his fields. Grass and cereals and fruit and stock will return abundant rewards for sowing and planting and caring for, and from these may be gathered full returns with large profits, if the work is done intelligently and skillfully.

To hold the plow, the spade, the hoe, does not bar the entrance to the great store-house of learning any more than wielding the pen. Nay, verily, toil unlocks the door and gives us free admission into the granaries of thought and all the hidden mysteries of nature.

The opinion has too long prevailed that the most ordinary common-school education is sufficient for him who is to be only a farmer. Thousands of farmers excuse themselves for not giving their sons and daughters a higher education on the ground that their boys are expected to be farmers and their girls farmers' wives. It is not strange, therefore, when a farmer's son or daughter is given the advantages of getting a good education, it implies engaging in some other pursuit than farming and the becoming some other man's wife than a farmer's. From childhood, the impression has been stamped on their minds that on the farm there is no use for any great degree of knowledge, no field for intelligence, no scope for intellectual activity. So the boy and girl with a thirst for knowledge and an aspiration to be and to do something in the world is driven to look beyond the sphere of the farm for a field for the development of their intellectual powers and the gratification of their aspiration for honor and usefulness. Is it any wonder, then, that the bright, ambitious boys—those who would give tone and honorable standing to farming as a calling– should break away from the farm? How to keep more of this class of boys on the farm is a question seriously agitating the minds of very many farmers just now. The first step towards this is to recognize the fact that a farmer needs as much education as he would require to prepare him to enter any other pursuit. There seems to be scarcely any branch of knowledge that may not be of use to him, not only by elevating his thoughts and developing his character, but by the direct bearing that it may be made to have on practical affairs. But how this knowledge and training is to be had, is the difficult question. We may answer that never before have the young men and maidens of our farms had opportunities for education so full as now. The schools are given more of a practical character than in the past. The young man or woman ambitious to acquire education may have unusual aid. Our normal schools, for the training of teachers, and our State Agricultural College, which is now assuming the high position it was originally designed it should occupy, furnish opportunities for learning far beyond any offered in former years. From our farms, the agricultural class of our State College should be constantly recruited to the full limits of its capacity. We shall then have, from the graduating classes of these institutions of learning, teachers to extend the field of knowledge and that useful blending of science and practice which shall give our farming distinction, and that broad intelligence which indicates special fitness in the citizen for positions.

Placing men and women in high positions may distinguish them in the eyes of the world, but it does not make them great. The great men and women are those who patiently bear the trials and hardships in life, who rely on truth, on virtue, on God. There can be, there is, but one greatness for all—that is greatness of soul. This can be attained by all. A woman may be only a farmer's wife or daughter and yet possess wonderful powers of intellect, of love, of seeing the beautiful in nature and art, of exerting good influence on others and turn to insignificance all outward distinction. A boy may be only a farmer's boy and yet be possessed of those most precious things in the world, the common lights of reason, conscience, and love.

Grand thoughts are the measure or test of intellectual greatness, and grand and noble principles are the measure of moral greatness, and these may be found in the little country homes as often, yea oftener, than in our legislative halls.

Successful men are not heaven-born geniuses whose knowledge comes by inspiration, nor do they trespass upon a woman's prerogative at jumping at intuitive privileges, but they weigh and balance and look at both sides of what they do. So much in farming depends upon the exercise of this faculty that too much stress cannot be laid upon it. The fact that rules which worked well one season may not apply at all the next shows its importance. A good farmer must combine the judgment of many different vocations; he must be a good financier—on a small scale, to be sure, but still a good one—also a good manager of labor; must combine the judgment of the grazier, the butcher, the gardener, and the merchant; he must also have that judgment about the conditions of the land and crop for which there is no written rule and which careful observation only gives, and, in addition to all this, he must have that quality for which there is no name, but which generally adapts means to ends and accomplishes things, which seizes the right moment to do the right thing, which knows when to finish one thing at a time, which is generally best, and when to leave that thing and do something which needs doing more—the faculty which keeps his whole business together, all done and right on time. This judgment is the farmer's first and greatest need; it is the high court which must pass upon all that is brought before it. The only man whose success is hopeless and who will never acquire it is he who thinks he knows it all in the beginning. Next to the judicial comes the executive. A farmer must work, must be busy all the time—not that he shall never take any relaxation, but he should work while he is at work and play when he plays, not trifle about, wishing he was something he will never be unless he tries, and tries in earnest. Besides the social visiting in the vicinity of home, a decided change is sometimes a benefit, and money expended in moderate travel will return in increased energy, whereas time spent merely in idling will furnish no equivalent. Aside from these pleasures, which should be the reward of toil, a farmer should diligently attend to his business every day. The amount of labor which he should perform with his own hands must depend upon the amount of business he conducts—on a small farm he must do more than where he has to superintend the labor of those whom he employs. The close personal attention to the details of his business is of great importance, as the leaks upon a farm are so many "the waste from the spigot is more to be dreaded than that from the bung." This, of course, applies to care of implements, and, in fact, to all which will be sure to appear to the watchful eye. We nowhere find the land "flowing with milk and honey," nor do we find gold lying abundantly in our pathway; but go wheresoever we will, there seems to be this law in force: that unless we work for somehing of value, we shall obtain only that which is without value to us. It s no less the case with the farmer, be he stock-grower, grain-raiser, gardener, or whatever of husbandry he may follow, than it is with the laborer in any other field. It is no mean study to try to till the soil so that with each recurring year the cost of growing an ear of corn or a blade of grass shall become less and less.

By studying the whole ground and planning as shrewdly as we can for each coming campaign of the soil and the yield thereof, we may accomplish a result not unlike that which General Moltke did for Prussia upon the fields of France. The earnest farmer is like the soldier who is buckling on his armor for a renewal of the contest, and looks upon the scene before him with an increasing weight of interest, and if the soldier on the field of battle needs to have somewhat of vim, so, too, does the tiller of the soil, for much depends upon how well he pushes the work at every important point.

What if some of the past season's crops were poor? Is that any reason why the next season's need be so? Perhaps there may be something done to prevent like results again. On the other hand, some of the crops were good, which should stimulate us to make the requisite effort to attain like results again, and at a lessened cost, if such be possible to effect. The tiller of the soil must be courageous. The inspiration of the hour must be, forward in the line of duty. Be thorough. A good farmer is never in a great hurry, for as sure as he hurries, he begins to destroy or neglect something. Whatever he attempts to do, let him strive to do well; not spend too much time upon what can return no money. When a field is in order plant it, and not until then. Pay greater attention to the condition of the ground than to the position of the moon. Do not have it cloddy, or waste time in working it as fine as a cabbage bed, when the extra work can yield no extra return. Even good things may be overdone, and a man may be particular until he is fussy. Fertilize heavily with barnyard manure, and be not stint in the application of commercial fertilizers, for it is very seldom that too much is used. Plow well. Plant and cultivate thoroughly and in season, and there will be found some money in every crop. And lastly, use some of this money in beautifying and making home attractive. Home is where the heart is, and to make his home one of heartfelt pleasure should be the aim of every farmer, especially so, as he is generally so remote from neighbors that the social enjoyments of life must be largely confined to the family. Home should not only be a gratification to husband and wife, but it should gratify the children—ah! that is the point—satisfy our children. Unless this is done there is no home. We must make our homes; we must make them pleasant—make them so our children will be induced to stay there. Then will our children be a source of blessing to us, and we shall see more sunshine and less shadow in the world. Let the query ever be—

> "What know I more that's worth the knowing?
> What have I done that's worth the doing?
> What have I sought that I should shun?
> What duty have I left undone?
> Or into what new follies run?
> These self-inquiries are the road
> That leads to virtue and to God."

The subject-matter of the essay having been declared open for discussion—

V. E. **PIOLLET** of Bradford county. Mr. President, I hear so much about education as qualifying men for agricultural pursuits that I have thought upon the subject a great deal. I suppose that education means a practical knowledge of the affairs of life, and I have observed that the farmers who have been successful are those who, from boyhood, have learned habits of industry, and it only comes to those who are necessitated to it. Industry is a habit. It must be fixed. If you are going to send a child to school, he must go there and must be kept to his studies until this habit becomes a second nature to him. If he is going on the farm, he must be drilled until it is a second nature to him—until his habits are so fixed that he can't shake them off. And wherever I go, all over the land, I always find that the successful man is the man of industry—the man who has ever been applying himself industriously *and with a will determined upon success.* Now, I will admit that I am not in love with our educational system. I pay largely towards it, and I wish I could receive greater benefits from the expenditure of money on account of it. You generally find that the men who go to school and go to college for years when they come out the first question asked is, I want a situation. His idea is that he wants to get something that somebody else has made. He don't come from the school, nor is he a self-reliant man, capable of grappling with everything around him and making a success of it as some of our men do; such are those who teach school part of the year and go to school the balance. Our most successful lawyers and our most eminent judges in Pennsylvania that I know were men that were not sent off to Amherst or Yale. No, sir; but they taught school part of the year and went to school part of the year, and when they went that far they paid their board and got the run of a lawyer's office, and by degrees, by excessive labor and industry, they became qualified to be successful. "There is no royal road to learning." There are many who won't do it. You may bestow all you possibly have and the child won't learn; he runs the risk of bad habits, and not being industrious, and the whole thing amounts to nothing. We should make special efforts to inculcate in our children these habits of industry. I would like to see our schools send out students with the idea of learning some trade, some mechanical trade, or some pursuit so as to make them independent, and are well fitted to fill, with the best ability, the position in which they may be placed. The farmers of the country have a great deal to learn; their sphere is not only to work, but to vote as well—to learn to take part in making the laws of this country, and that the expense of running the Government is not more incumbent upon them than any other people. But a few days ago the people of this great Commonwealth erected a monument to the memory of Governor Simon Snyder, a man who had learned a trade, learned industrious habits from his youth, rose to eminence, and was a useful man in every position he occupied. Governor Ritner, reared to toil, was a man of industrious habits all through his life; so was Governor Shultz. In those times we had an inexpensive government, and we had it instilled into our minds that we had not a right to take the public funds in order to enrich a man in office, but to give him what he could make in any other avocation, and he was to come back to his constituents as honorable a man as when he left. These remarks I advance in connection with the remarks of the member from Crawford.

Dr. E. **HARVEY** of Delaware county. This is a very interesting question to the farmer: How much education shall farmers give to their boys if they are to be their successors? It is a question that every farmer has puzzled his mind constantly and seriously as to what to do with our children to prepare them for the duties of life. It is a very serious question to all parents as to how much education a farmer should have, and one of the questions is, what should be taught to make him in love with farming? Education has two uses: one is the storing of the mind with useful knowledge; the other, higher purpose of education, is the cultivation and discipline of the intellectual part of our nature, making the training as we train a horse for running fast or trotting fast. The mind must be trained in the direction in which it is expected to be used; it must have stored away that knowledge which will be called for in life, and, by the suggestion of Mr. Piollet, the industrious man is a successful man, and that is a habit. One of the evils of sending boys too long to schools and colleges is that they get away from habits of industry, and the man that goes to school part of the time and works the other part is a successful man, because he has kept up the habit of industry, and industry is a habit. I remember once that a great stout fellow came begging at my father's door, while I was a boy, and I asked him why he did not work; picking his teeth with his thumb nail, he said: "I got out of the way of it;" and they never get at it again. If a boy has been to school, and been there for so long, and learned everything that pertains to the farm business, he can be put to work again, and should be put to work under the supervision of some one until he acquires habits of industry. I really think there is no danger in over-educating a boy in any direction which will discipline and cultivate his mind, if that habit of industry is not broken. There is a great deal of education that has no practical application in the affairs of life, such as learning the dead languages, higher mathematics. Horace Greeley said he never knew anything about algebra in his life. It is not that the boy will be a civil engineer or a surveyor or anything of that kind that he learns mathematics, but to train his mind to thinking, and the trained mind can apply itself to anything, always think logically if trained well. There is no incompatibility in the training of the mind and keeping up habits of industry. I am glad we had that suggestion that industry is a habit.

V. E. PIOLLET. In my town one of the most successful and money-making farmers has, I think, eight boys. He has made it a practice, under my observation, for now nearly twenty years, to hire his boys to work for him in preference to any other. They go to school in the winter, and when spring comes they hire to their father, and they are paid just what they can earn. They are all good men, as they have come to mature life and gone abroad. Why, that home is a better place than any college on the face of the earth. Now, farmers, that is the place a man can't be self-learned, but he can be self-educated.

J. A. HERR of Clinton county. The subject has taken a much wider range than I supposed it would. The question is, What is a farmer? I was prepared for that. What is a mechanic, what is a lawyer, what is a physician, I might not be so well prepared on. A man educated is qualified to fill the position of a farmer, but I make the broad assertion that four fifths of the persons assessed as farmers are simply farm laborers. I hire a man for a very moderate sum who can plow more than I can, and do other work just as fast, dig ditches, spread manure, is that man a farmer? I have heard one of our most distinguished farmers say that he never plowed a furrow, and yet I regard him as one of the leading farmers in our country. He has the habits of industry and the habits of business combined. I will indorse all that has been said concerning the education of the farmer because the amount of information that a farmer is required to possess requires an extraordinary intellect. He has to have natural tact as well as habits of industry. I can indicate farmers who have been industrious by hard labor with very little study, and the consequence is that the habits of their lives run in a rut. Now, I concede that a farmer must read up to his calling. He must cultivate his mind and educate his mind to the business of his life, and the man who is a farmer who will answer this question as to what must be, will say that it is a man that has experience in all farm labor.

Mr. HILLES of Towanda. I did not come here to talk, but at the same time I would not like to have the members of this society go away from this place and be under the impression that we do not care anything about education. The remarks that some made here this afternoon seem to indicate that that is the view we take of it in this section. If such be the case, it is entirely erroneous, because of the fact that two of the things we pride ourselves upon is our public schools and our collegiate institute. And another we pride ourselves on is, that the best farmers we have in the county have received the best education, and are the most successful farmers. It has been said that it requires habits of industry, and that alone to be a successful farmer. The ants, the caterpillars, and potato bugs are of a very industrious character, and therefore, according to that idea, they might be the best, for they are industrious. The farmer has to be industrious for the purpose of fighting them, but the little brains that is necessary to put the proper remedy on the bushes will destroy the caterpillar and potato bug—brains predominate over labor, but not unless they are developed, however,—not unless they are trained and systematized. I have listened to the discussion, and the question was asked, What was the cost of a quart of milk in its production ? Not a farmer has been able to tell what the cost is. I cannot tell how much a pound of butter will cost, or how much a quart of milk will cost, and the inference is plain that our farmers need a mathematical education, one by which they can put down the figures and know what they expend, to know what it cost them to make their butter and milk their cows. Talking about having too much education to spoil him for any avocation—if every farmer here were a college-bred man he would be a better farmer and a more successful one, too. You go up in our schools to-day and ask them practical questions and they will answer. We are trying to get them to be educated in a practical manner, and if they can't keep an account so as to be able to tell things of that kind they have wasted their time, and if the latter be true, it is proof that they have not gone far enough to make them what they ought to be. One of the things that will drive the boy away from the school is to make him industrious all the time and nothing else. Keeping him at work until sundown, and doing chores until bedtime will drive him away from the farm. The doctor here referred to the man who came begging to the door of his father, and who said he was out of the way of working. I will venture to say that he was not an educated man ; that is, not the class of men that are traveling around through the country. I say, give your children all the education they can possibly get. Do away with our common schools, our superintendents, and our teachers, as they are the incidents of our schools that keep the farmer poor ? Not a bit of it ; it makes them intelligent ; it saves labor ; gives them knowledge in the practical application of their intellectual culture, and saves them the sweat of the brow. It is the education of the men that shows them how to make butter in an easier way, and I would not have it that the people would go away from this town and think that our people don't believe in the highest education in this section.

Mr. SEARLES of Susquehanna county. For the last twelve years Mr. Piollet has given his undivided attention to the higher education of the farmer. Now, while I agree with him on this subject that industry and perseverance are among the greatest elements in the world to bring success, yet we can't allow our farmer boys to come up ignorantly, or, in other words, we can't allow them to come up unless they are the peer and best educated in the land ; or, if we do, we must always occupy the position that we are "hewers of wood and drawers of water." I cannot let the members go out and believe Colonel Piollet is not in favor of higher education, because we all know that if they are not educated in the higher walks of life they will not be equal to the occasion.

THE QUINCE.

By JAMES CALDER, *Lecturer of Pennsylvania State Grange, Patrons of Husbandry.*

The duty assigned to me on this occasion is the pleasant one of narrating the good qualities of a fruit which is not duly appreciated, and directing attention to a source of pleasure and profit of which the multitude of agriculturists are practically ignorant. I am to speak of the quince, a fruit well known to our ancestors long ages before the discovery of America, which the early settlers on these western shores brought with them from Europe, but which we who have succeeded them have developed far less than its capabilities permit, and have employed for our advantage to so small an extent that to the majority of us it has been useless.

From ancient writings, we learn that the Greeks and Romans knew the quince, well used its fruit extensively, and esteemed it highly. According to Pagan usage, they ascribed its good qualities to the direct acts of their gods. They employed it in many acts of worship, and believed its use to be productive of many desired benefits. Thus, in its season, it was always among the offerings presented at the shrine of Venus, especially when the prayer of the petitioner was a longing for happiness or an appeal for help to secure a return for unrequited love. In the enjoyment of the deliverance which has been wrought for us from such heathenish practices and childish superstitions, we have in this, as perhaps in other instances, not only withheld the good thing from the idol, but have unwisely turned our backs upon it as a creature far less useful to us than was intended by the Giver of all good.

From the time when its beautiful blossoms of reddish-white gladden the eye and delight the sense of smell, until its golden fruit enriches the diligent housewife, it is one of the most worthy objects on the fruit farm, and wins the praise of all who behold it.

Varieties.—As the quince grows readily from the seed, and, like many other kinds of fruit, sprouts greatly under that method of propagation, we find many varieties of it in existence. Among the best known in this country are the Portugal, the Apple or Orange, Rea's Seedling and the Champion. As tested on my grounds, near Harrisburg, I esteem them in the order named, the last being the best. I give the Champion this position because that, with me, it is not only equal to the others in size, beauty, and flavor, but the tree is the handsomest on the list, and has come into bearing at an age which is several years less than that of the others. This last is a consideration which those who have waited long for the popular Apple variety to reward their labor will highly appreciate.

Propagation.—Beside the method of propagation by seeds, as just adverted to, the quince is easily multiplied by cuttings. These should be made in the fall, of well ripened wood, and each should have attached a portion of the branch from which it was taken. They should be six or eight inches in length, be tied in bundles, and kept in sand or a pit during the winter, and set out in the spring. Only one or two buds should remain above ground, and the soil should be kept scrupulously clean, well stirred, and have the benefit of a mulch.

It is also propagated by layering, after the manner of the grape-vine; and also by budding and grafting. It will thus be seen that by this unusual facility for multiplication nature intimates the usefulness of the plant and encourages man to fully test and enjoy it.

Soil. —From the facts already stated it may be inferred that the quince will grow in almost any kind of soil. Such we believe is true. Because it does not die in wet locations, some have concluded that not only is it capable of living there, but that such are best adapted to its cultivation. But this is a serious error, as I have learned to my cost. It will live, indeed, near streams and in damp ground; but its fruit there will be inferior in size, shape, and quality. Dry, gravelly soil will be found the best; especially that of uplands.

Cultivation.—The trees, when grown in an orchard, should not be less than eight nor more than twelve feet apart. The ground should be kept free from sod and weeds, and frequently lightly stirred. Mulching proves very beneficial.

Training and Pruning.—By nature the quince is inclined to throw out many suckers and to take the bush form. Experience shows that the best results are obtained by giving it a stem of from two to four feet in height, keeping the head well opened, and an annual shorting in of the bearing wood. Probably no fruit-bearing tree is so much neglected as to the matter here under consideration; and yet none demands it more or shows more grateful returns for attention. The advantage arising from thinning out the fruit soon after it is set is very great, but is believed in and practiced by but few. Those who persevere in the practice find reward in the undiminished weight of crop and increase in beauty and quality of the fruit.

Fertilizers.—Well-rotted barn-yard manure, applied as a top dressing, and extending as far out as the circle of the limbs, proves to be very beneficial. It should be put on in the fall, immediately after the shedding of the leaves. Salt, used in a similar manner, does good; and an occasional dressing of wood-ashes is desirable.

Diseases and Enemies.—The blight, which is so destructive to pear trees, attacks the quince also, but not with so deadly effect. Frequently it extends to only a portion of the limb attacked, and the tree lives on. The effectual remedy is, as in the case of the pear, to at once cut off, some distance down in the good wood, the diseased branch and burn it up forthwith.

The apple-tree borer plays havoc with the neglected quince; but needs not be feared by the owner who will get down upon his knees and fight the enemy betimes with knife and wire. The slug loves to feed upon the leaves, but quickly dies when dusted with air-slacked lime or dry earth.

Usefulness.—While few of those who can grow the quince do so, all desire to possess it when grown. It is a universal favorite, and may be called "a general purpose fruit." It is excellent for canning; is equal to any other preserve; makes the best of butter, and surpasses all other fruits for marmalade and jelly. Not the least of its uses is to give flavor and character to preparations of other fruits, which, without it, would be undesirable. It is claimed to have medicinal qualities, being wholesome as well as toothsome. A preparation made from it is beneficial in cases of asthma; and in another form the ancients prescribed it for dysentery; and in still another it was regarded as cooling and strengthening. A wine made by adding four pounds of sugar to one gallon of the liquor, in which the sliced fruit had been steeped over night, has always been esteemed by those who use stimulating drinks. And, lastly, it may be added that the seeds steeped in water make a cheap and serviceable mucilage.

Profitableness.—This discussion of our topic will not be complete until we have considered whether quince-culture will pay—will pay in dollars and cents. It matters not that the tree is easily propagated, that it will grow anywhere in our State, that its blossoms and fruit are beautiful, that it itself may be made ornamental, that the wives of the towns-people desire it, and that farmers' wives find it a treasure. All this may be true, and yet the average farmer will not see why he should "bother with quinces." Yes, with many of our tillers of the soil, the fact that a tree is pretty, and it and its fruit afford pleasure to "the women folks," is reason enough why men should despise it and not give it room—no, not even so much as among the elder-bushes in a fence corner.

Well, to those who require an additional reason for growing quinces, it may be said that quinces do pay—in dollars and cents. When fairly treated the trees live—live long and bear well. The fruit does not perish quickly after maturity, as do cherries and peaches, but can be kept several weeks in a marketable condition. There is a constant demand for it. I have visited a majority of the States of the Union, and in each of three of them I lived for two or more years, and yet in none of them have I seen that producers found difficulty in selling quinces, or even could supply the demand. When, a few years ago, I set out sixty trees, I feared I should overstock the market, but my annual experience has shown that I fell far short of the mark. Last month I was the guest of a Pennsylvania farmer, who is the owner of three hundred bearing quince trees, and he assured me that he found immediate sale for his entire crop in his county town, whose population is less than four thousand. And as to prices, surely those who grow quinces ought not to complain when they receive an average of three cents apiece for them, which, in recent years, is about twice the retail price of oranges.

THE ANSWER TO THE PROPHECY.

By Dr. J. P. Edge, *of Chester county.*

Some of my hearers, doubtless, expect to hear me review the "weather prophet," and show up some of his hits, his mistakes, and his amusing eccentricities. While this would be a fruitful as well as a funny field to work, I must leave it for the enjoyment of some one more skilled in aërial husbandry in which to fly his kite.

It is very much to be desired, however, that this subject of the weather indications shall claim an early and exhaustive review by this Board, as being one of the most important matters that should have its attention.

I will not disturb "Old Prob," therefore, but will refer to some predictions of my own—not made, however, in the prophetic or Scriptural sense of the term—that of preaching—lest my granger colleague from Bradford shall again accuse me of being a D. D. instead of an M. D.

But I might, all the same, be excusable if, in the closing hours of my nine years' service in this Board, I should indulge in some earnest exhortation that its great work, so well begun, may go on, enlarging and expanding with its years.

We may query what had been the *status* of the farming interest in Pennsylvania ten years ago. Was it not that of an utter absence of a bond of union or center around which to rally for mutual benefit and protection or go for information or aid in the promotion of its work? It is true, we had local societies, farm clubs, granges, &c., scattered here and there in some districts of the State; but with what little success were these aiding the mass of farmers in the discussion and trials of methods and implements, beyond the chances offered them at the occasional fair, and even at these the mind was so diverted and distracted by the mixed display as to shut out the chance for a profitable interchange of experience.

The Grange had its social and mutual business advantages, but, as an educator in the various details of practical farming, it did not reach the masses. There was no effective central bureau where all matters could be referred and acted on by an official in possession of the authority and the means in hand to secure accurate or useful attention.

The patient tillers of the soil were drifting much at the mercy of dull chance, and were too often the convenient victims of the sharp tradesman or his sharper middle man. The farmer, as a rule, and it is not yet entirely out of use, was compelled to accept such prices as were fixed for him without his judgment being consulted and without reference to value as based on the cost of production. He was also required to pay for what he bought just what the custom or the caprice of trade demanded. While he was bearing the heavy end of the burthen of taxes he was not expected to want, and in fact did not get, much attention from the law making machine on the "Hill." He was especially useful during political campaigns and at elections, but had to stand aside when corporate interests or political demands required the attention of the law-making power; especially so if the sporting associations required the game of the field and the forest to be protected by enactments under which he was expected, and indeed required, however much against his will or interest, to foster and feed all game animals that might invade his premises, in order that these gallant sportsmen could enjoy the *open season* thereon in the destruction of game. Such was something of the condition of things when the modest bill proposing the establishment of this Board was introduced in, and kindly passed by, the General Assembly at the session of 1876.

In the course of some remarks in advocacy of the measure, as a member of the House, when the bill was under passage, these expressions were used in its explanation:

"It (the bill) was prepared under a belief that now in the Centennial year is a fitting time to organize on a broad, permanent basis, the great industry of the State on which all others in a large degree depend.

"The purpose of the bill is to develop and concentrate the farming interests under the direction of a department of the State Government, and to secure for it a reliable center from which can issue reports and statistics of production, improvement in the theory and practice of husbandry, and of the kinds of crops and domestic animals best suited to our widely different climate and soils; the consideration of diseases known and new to which those crops and animals are liable, and the study of the insects both useful and destructive to them.

"These results can only be secured by a well-organized department, such as is provided for in this bill. There are single benefits to grow out of it that will pay back to the State many fold of the small expenses of the board.

"It is the concentration and diffusion of such careful investigations among the people in an authorized form that is intended here. It is an aid and prop to our State College, which will extend its usefulness until it shall become the most powerful agent in educating the farmers' boys. It is to aid in protecting the farmer against the fraud, now so widely practiced, in the item of commercial fertilizers, by having tests made and published, so that every man who has occasion to deal in them may know whereof he buys. The farmers of this country have been robbed of millions of dollars in these mixtures, and the authorized publication of these analyses will effectually check this fraud and pay back to the State far more than she invests in her Board of Agriculture."

At the second meeting of the Board, held in the Senate chamber, May, 1877, your essayist made use of these words, in a paper there read, entitled "The Future of the State Board of Agriculture."

"That future and its possibilities will, in brief, be just what the farmers of Pennsylvania shall have them to be. If they, in the spirit of progress that is active all around them in other departments of industry, shall take this work in hand, and through it build up and establish on a firm foundation their class interests, through its machinery, there can be no question about its future.

"What, then, are the main purposes to be kept in view to insure to this Board and the people of the State benefits that shall establish its going, and make it a paying investment? The first idea is that it must be a reflex of the local organizations; a popular representative body. If they are healthy, it will be alike strong. But if they be languishing, it should possess the power in itself to strengthen and establish them. The local society has the absolute control over the *personel* of the body, and its results depend, largely, on the class of men they send to it.

"The second requirement is that a liberal policy shall be shown by the State in placing under the control of the Board the means to make its work effective.

"The third requirement is that the Board itself must compel approval by its acts, and demonstrate that the farming interest of Pennsylvania is not to be left to languish for want of public support."

And what has been the answer? Among the first and most vitilizing was the prompt and decided interest shown by Governor Hartranft. At and from the first meeting he became an active patron of its Board, assigning for its use one of the most desirable rooms in the Capitol, that formerly occupied by the Supreme Court; was always, as the presiding officer, earnest in bringing out its work; and through his messages to the General Assembly, urged its claims on their attention, in supplying the means to further its purposes. His successor, Governor Hoyt, was also a warm supporter of the Board, and did much to aid it. But it has remained for our present Chief Magistrate to become known of the farmers as their friend, by reason of his familiar intercourse among them while acting as our presiding officer, and as the head of the commission on epidemic diseases among domestic animals. His messages to the General Assembly may be referred to with much satisfaction as evincing the earnestness of his conviction that this Board is engaged in a good work.

Again may we find a partial answer in the eight annual reports and the twenty-eight quarterly reports of our proceedings. I think it not presuming too much to assert here that the literary and scientific standard of these publications, taken as a whole, as well as in detail, both as applied to the stated papers, the general proceedings, the discussions, the work of the Secretary and of the committees, both special and standing, will compare favorably with any similar number of volumes issued as State reports.

But when we come to look into the practical results that have grown out of this recorded labor—a labor of love, by the way, to a large extent, as most of us can testify—who can estimate the gain, much more the savings from loss, not only to the farming, but to the general business interests of the State, resulting from this work? I would not weary you further by going over in detail even the more important of these results. Almost any one of them has given back to the State, in money value, much more than the entire expenses of conducting the affairs of the Board from its beginning.

But it remains to say that what has *been* done only serves to show what might have been, if the means had been provided to carry out the broad schemes that were included in the general purposes of its creation. Among these I may name the idea of the establishment, under the partial management of this Board, of a grand State agricultural and industrial museum, in which all the industries that bear any relation to production would have their illustration. Any of you who have visited the museums at Edinboro' or London, or in some of the capitals of the continent of Europe, will take in the breadth covered by this idea of a State museum.

As yet, we have not been strong enough to demand what we should have of moneyed support, but it will not be long, if the body remains true to its mission, until the demand will come from the common voice that the means required shall be liberally supplied to carry forward its manifest destiny.

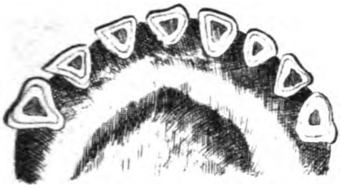
It has been fully shown, as part of the history of our recent sessions of the General Assembly, that the power of the farmer class has greatly enhanced in the matter of securing asked-for legislation. This result may be fully credited to the existence and exertion of this body; for, while it has been kept aloof from the semblance of a lobbying agency, it has brought to bear such strong demands from the people as to compel attention.

And yet it remains a reproach on the enlightenment of Pennsylvania that other States, less favored in soil and climate, some of them not distinctly agricultural States, and with far less area or population, do annually appropriate for the fostering of their farming vastly more money than does this great Commonwealth.

The work of this Board is in its infancy, as yet, and the spirit to be shown by the parties most to be benefited must determine if that work shall go on and grow with the years, until the latent greatness and wealth of the State shall be fully developed.

It only remains for me to say, for this paper has already grown too long, that not among the last or least of the answers is that we have not had, either in the personal make-up or in the working operations of the Board, the faintest smell of politics about it. Neither has there been shown, other than what has arisen from an earnest difference of opinion or policy, a notable want of harmony at any time. This is a most commendable fact, and should be the guide for the future if the full answer shall be known. That answer must in the future, as it has in the past, depend on the fitness of the several component parts of the Board for their duties and the willingness of the members to put a strong shoulder to the wheel of progress.

This is not the place to discuss the policy of a change in the manner of representation here, but it is very apparent, from the large and still growing membership, that the answer to the prediction that the Board should be a popular representative body has been fully realized.



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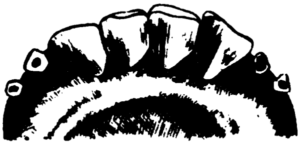

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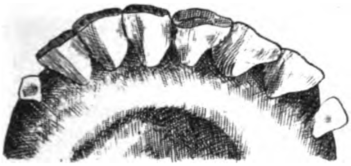

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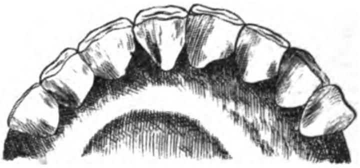

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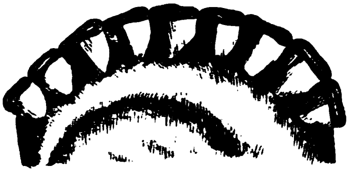

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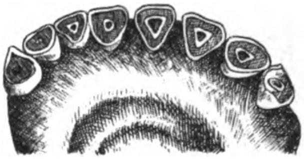

At 10 Years.

THE AGE OF A COW AS INDICATED BY HER TEETH.

THE GUERNSEY BREED.

By WILLIS P. HAZARD, *of West Chester, Pa.*

Among the various breeds to which popular attention has been called in recent years, there is none deserving a higher place in public estimation than the Guernsey breed, whether for dairy purposes, or the later garnered profit as a beef animal; and yet, perhaps, notwithstanding such strong claims upon the farmers' and breeders' attention, no breed is so little generally known. Not only are there very many who have never seen a Guernsey, but there are a vast number more who have never seen the milk or butter, and a still greater number who have never eaten Guernsey beef. Those who have not, have yet to see the deepest golden-colored milk and cream, the most saffron-colored butter, requiring no adventitious aid from the coloring maker either in summer or winter, and to taste the most highly-flavored beef in existence, having a peculiar aromatic flavor of its own.

This breed may be said to be the happy medium between the diminutive Jersey and the huge Friesian, and comprising the merits of both breeds. It is thus *par excellence* the farmer's breed, especially for the butter-making farmer. Docile to an extreme, bearing neglect of care well, it yet will repay careful attention and good breeding with as much interest as can be expected of any bovines.

Even to the *dilettanti* whom nothing but a solid color will please, its rich golden-hued skin will prove attractive, and recommend its pleasantly combined hues of yellow or lemon-fawns and white; for in no other breed will there be found such an exudation of butyraceous material filling the pores and the hair with unctuous matter, producing that softening effect so dear to the hand of the expert, and to the breeder for butter; at least, as a general rule in this breed, it being the exception in other breeds. While to the practical man, who knows that color of the hair has not the slightest influence upon the yield or constitution, the charming softening effects of the blending of the golden-fawns and white are sources of perpetual delight.

As this is as old a breed as any other, has been kept purely bred as long, and was imported into this country as early as the Jersey, there must be a reason for its being comparatively so little known or extended. The earliest settlers in the sea-board districts were Dutch, Swedish, and English. They naturally brought with them the cows from their homes, and thus, with the intermingling of their cattle, there sprung up what is now termed "natives." As it was desirable to improve upon these with pure-bred stock, the Devons, the Short horns, the Jerseys, and Guernseys were imported, the latter two in the first quarter of this century. They at once attracted great attention for their richness of yield. Each breed was imported indiscriminately from either island under the general name of Alderney. As they became fashionable in England, and as each island restricts importations, the true distinction finally culminated in the formation of clubs for each breed. The Jerseys, from their great beauty, as well as merit, have taken the lead, their praise has been heralded in every manner, and, being now backed up by records of great performances, the breed has a permanent hold in this country, and as merit is guiding selection now, its claims to value will increase. Thus also it is with the Guernsey. The earliest importations made by Colt, Biddle, King, and others have been maintained in abiding faith by many others. But for many years past those who were developing the Guernseys in this country were too busy enlarging their herds, and having none to spare, did but little to call attention to them. But as a knowledge of their merits spread, dealers have steadily been increasing their importations, and breeders have gone over and made selections, until now there is beginning to be a supply for the rapidly increasing demand.

The breeders of Guernseys owe much to the enterprise of Samuel C. Kent, of West Grove, Pennsylvania, the home of Thomas M. Harvey, and rapidly becoming the great center for the development and distribution of the breed. The circle has gradually widened until now it extends southward to North Carolina, where Dr. Bahnson, of Salem, Dr. Richard H. Lewis, of Raleigh, and others; and to South Carolina, where J. B. Turner and others have taken hold; to the West at Minnesota, and to Wisconsin, where Mr. Clapp, of Kenosha, has distributed many; in the East, New York, Massachusetts, and Connecticut have large centers from which radiate Guernsey circles; so rapidly is the breed now spreading, our prophecy of a few years ago that it was one of the "coming breeds" is now a fixed fact.

The American Guernsey Cattle Club was organized in February, 1877, and has been of vast use in furthering the interest of the breed; not only in this country, but by its influence in Guernsey, where two herd-books have been recently established. But divided counsels have prevailed and both have been recognized, when there should be but one, and that under the auspices of the Royal Guernsey Society. Already one of the evils is shown by the multiplicity of initials that have to be used in every pedigree to show which herd-book the animal is registered in, it sometimes being in both!

There has recently been formed "The Guernsey Breeder's Association," Philadelphia, which is doing much to advance the breed.

As the island has a history of over two thousand years, as the cattle have strongly-marked peculiar characteristics, maintained by a rigid exclusion from the island of any other breed, it seems not worth our while to enter into the disputed question of the origin of this breed of cattle, but to content ourselves with their present excellencies as we find them at this day. We may, in passing, state our belief that they are of Norman origin, though there is some testimony which might lead us to suppose they might have originally been brought over by the Danes, or at least that some animals were imported by the Danes and mixed with those found on the island. As Normandy and Brittany are the nearest coast-landing of France, with which there is constant communication, and as the present Norman breed, the Contentine, and the like, are similar, almost equally noted for their rich dairy qualities, and yielding the most superior butter, that known as coming from Isigny and Bayeut, and bringing the highest price in the London market, I say these points should have great weight in ascribing the main origin of the Guernsey breed to Normandy. Be that as it may, the most unprejudiced mind, after becoming well acquainted with all the merits of Guernseys, must admit that they have no superiors for their peculiar traits.

These may be summed up in few words. The Guernsey gives a larger quantity of milk of all the breeds which give *rich* milk; she gives the quantity for a longer time, more continuously; it is the deepest, the richest, in color of all milks; it is the most unctuous of all milks; it is unsurpassed in yield of butter-fats, less than five quarts having made a pound of butter, even with the few tests that have been made; the butter is the highest and deepest tone of all self-colored butters; the butter will go farther, being the richest in butyraceous particles; it has a peculiar rich flavor and aroma; the beef is remarkably juicy, well interlaid with fat of the deepest color, tender, and of the highest flavor, and the carcass dresses well and profitably; considering that there are but six thousand head of cattle on the island, and that there must be more or less close inter-breeding, she is a very sure and regular breeder; and reproduces herself and her fixed types with exactitude; her docility and gentleness, most important traits in a dairy breed, are remarkable, and the males are of amiable and gentle disposition, seldom becoming cross or desiring to roam.

In size, avoiding the diminutiveness of the Jersey on one hand, and the gross size of the Dutch cattle on the other, the Guernsey is of the size easiest maintained for good returns, and when killed for beef, cuts to profit. As oxen, while not quick stepping, they are patient and assiduous.

The color is peculiar, mainly running in shades of orange and lemon fawn, either in solid masses or prettily broken with masses of white. Formerly the black and brindle were more common than at the present time. The skin is usually of so rich a golden color as to be unrivaled and extraordinary. Its unctuousness mellows the skin and softens the hair, and exudes in a yellow butyraceous powder. The golden rim around the eyes, the collections in the ears, and the dandruff at the end of the tail, all proclaim the wonderful richness of the animal.

The long-continued similar course of breeding which the Guernsey has undergone gives it that power which we term potency; the ability to produce like, to repeat itself, whether upon members of its own breed or upon those of other breeds. It is this quality which renders the Guernsey bulls so valuable to stamp their get with the peculiar richness of the breed; this is so lasting that it takes generations to breed it out. We know of instances where a bull was introduced twenty years ago, and the butter marketed from his descendants shows the rich color and good flavor to this day. Guernsey grades are of the very best.

The continuity of her yield is one of her most valuable traits, for by this pertinacity, yea, even up to her calving, even the moderate milker in this length of time catches up and yields in quantity more than the common cow that milks well for but three or four months, or that goes dry for two or three months, gradually failing up to the time of stopping. This is especially valuable to the owner of but one cow, and where he owns two cows and insists upon their taking a natural and needed rest of six weeks or two months, he can so arrange it as to have always his milk and butter. Like the hare and the tortoise of the fable, it is the steady, continuous milker that yields the most.

The Guernseys are hardy and tough, and therefore fitted for any section of this country, and we know of no breed so suitable for the rapidly increasing number of dairies in the West, the far West, and the North-West. On their own island they are exposed more or less every day in the year, in the daytime in the hot suns and at night to the heavy dews, and to the atmosphere heavy with cold and dampness, provocative of rheumatism in the inhabitants. If these cattle, on a small island exposed to the bleaching sun and at times to such withering blasts that I have seen whole hedges, trees, and shrubs blackened by them as by a devastating fire, can stand such changes, they are well-fitted to the hard life on many of our farms, especially in the unsheltered West. The farmer and the dairyman want a cow of good size they can turn off for beef that while alive will pay well in milk and butter. This seems to be a *sine qua non* with farmers of the East as well as of the West.

Actual Guernsey Production.

We present the records of five cows of the herd of Ezra Michener, Carversville, Bucks county, Pennsylvania. This farmer's herd is kept for its yield of butter, which sells regularly throughout the year for fifty cents per pound, and, for the profit, from the increase. Mr. Michener was one of the early breeders of Guernseys, having purchased animals in 1875, and year by year enlarges his herd and is more enthusiastic in their praise. These records are condensed by us from the tabulated weights for every day, kept by Mr. Michener, and we can vouch for their entire correctness.

Rosalind, cow five years old, sire Pilgrim, dam Carrie; weight, eleven hundred pounds; escutcheon, Flanders 3d; calved, April 3, 1880. Her milk was weighed from April 11, 1880, to April 11, 1881, and she yielded seven thousand three hundred and seventy pounds, or an average per day of twenty and one fifth pounds for every day of the entire period. To show the uniformity and continuity of her milking, we give the total and averages for each month, commencing with April, which lacked ten days: 678, average, 34; 1,018, average, 33; 834, average, 28; 800, average, 26; 779, average, 25; 558, average, 19; 561, average, 18; 470, average, 16; 432, average, 14; 464, average, 15; 379, average, 13; 323, average, 10; 323, average, 10; 74, average, 7, for ten days in April, 1881. She was taken to the Philadelphia fair in September, which made her fall off in that month.

Mattie, cow three years old; sire, Sir Champion 3d, dam, Lulu; weight, nine hundred pounds; escutcheon, Flanders 3d; calved, August 13, 1880. From September 1, 1880, to September 1, 1881, she gave seven thousand one hundred and thirty-five pounds, or an average of nearly twenty pounds per day for the whole year. Her uniformity of yield was wonderful, commencing with a daily average for first mouth of twenty-three and one half pounds and ending with a daily average for last month of nineteen and one half pounds.

Lulu, cow five years old, dam of above heifer; sire, Commodore, dam, Minstrel; weight, nine hundred pounds; escutcheon, Flanders 2d; calved, September 11, 1880. Record of weights commenced September 20 and continued to July 12, and resumed after calving, August 19 to September 19. Record for the year, five thousand seven hundred and nine pounds, or an average of seventeen and one half pounds daily, besides having a calf.

Daisy, cow six years old; a Grade, sired by Napoleon out of cow called Daisy; weight, one thousand pounds; selvage escutcheon; calved, May 1, 1880. Her record from May 9, 1880, to same date in 1881, was six thousand three hundred and eighty-nine pounds, or an average per day of seventeen and one half pounds. The record was from May 9 to November 14, and then from March 23 to May 9.

Violet, heifer two years old; a Grade, sired by Sir Champion 3d out of Mabel; weight, eight hundred pounds; escutcheon, Flanders 2d; calved, August 10, 1880. Record, commencing September 5 and continuing with only four days' intermission, of five thousand one hundred and ninety-four pounds milk in the year, or a daily average of nearly fourteen and one half pounds.

These records are not extraordinary for Guernseys, but are given as samples of a fair yield for good cows, well fed, and for the continuity of yield; this, too, of the *richest* milk of any breed, showing that they give quantity as well as quality of the highest order, stamping them as truly profitable cows.

GLIMPSES OF LANCASTER COUNTY.

By Hon. J. Simpson Africa, *Secretary of Internal Affairs.*

[Read at the Autumn meeting.]

William Penn obtained the Royal Charter for the Province of Pennsylvania March 4, 1681, and it was publicly proclaimed by command of Charles II, King of Great Britain, on the 2d day of April following,* and on the 10th of April† he commissioned his kinsman, William Markham, as Deputy Governor, authorizing him to call a council, settle the boundaries with adjacent Provinces, survey and rent or sell lands, erect courts, appoint officers that right may be done, the peace kept, and all vice punished, without partiality, according to the laws of England. Markham arrived on the Delaware about the first of July, and conducted public affairs until the Proprietary arrived, on the 27th day of October, 1682.‡ The Province was divided into three counties, viz: Bucks, Philadelphia, and Chester. and an election was ordered to be held on the 20th day of November, in these as well as in the three lower counties—now constituting the State of Delaware, which had been purchased by Penn from the Duke of York—for the choice of seven representatives for each, to meet in General Assembly on the 6th day of December.‖

No record of the dividing lines between Bucks, Philadelphia, and Chester, as originally established, can be found, but the Governor and Council, April 1, 1685, § fixed the lines of separation between Philadelphia and Chester practically as they now remain between Philadelphia and Montgomery on the one side, and Delaware and Chester on the other side, from the Delaware river to the Schuylkill river. The lines of division on the southwestern side of the Schuylkill were the subject of some subsequent disputes, which were quieted by changes made therein. All the territory that was afterward erected into Lancaster county was, by these lines, placed within the jurisdiction of Chester county.

In 1701, ¶ during the Proprietary's second visit to the Province, he made a journey of observation across the country from Philadelphia to the Susquehanna, and viewed the beautiful and fertile inland valleys of his domain. The country was crossed in various directions by Indian trails, along which adventurous English and French pioneers passed on excursions of exploration, or for trade with the natives, but no settlements were made west of the Octoraro until 1709, when a number of Mennonites, with their families, from Switzerland and the German Palatinate sought homes in the valley of the Pequea. Of these pioneer families numerous descendants of the Herrs, Mylins, Kendigs, Millers, Oberholtzers, Bowmans, Funks, and others are found in Lancaster county, elsewhere in Pennsylvania, and scattered over the States of the West. Other bands of emigrants of the same faith fleeing, like those who preceded them, from the religious persecutions to which they were subjected in the Fatherland, arrived in 1711, 1717, and 1727. Next after the settlement of the first of the Mennonites came the French Huguenots from Alsace and Lorraine, and located in the Pequea valley. Their names can be recognized in several townships in the county, but by intermarriage with Germanic neighbors they became thoroughly German in language and habits. The Scotch-Irish invaded this region about 1715, and located on the Chicquesalungo creek, and subsequently spread several miles up that stream and over a considerable part of the territory now included in Dauphin and Lebanon. Other settlements of this race dotted the banks of the Octoraro. About 1717, a settlement of Welsh was made at Churchtown, which subsequently gave name to the township Cærnarvon, and to the Welsh mountains, of which so much has lately been said in the newspapers. Germans of the Lutheran and Reformed churches are also found in many townships.

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* Hazard's Annals, p. 502.

† *Ibid*, p. 503.

‡ Hazard's Annals, p. 596.

‖ *Ibid*, p. 603.

§ Col. Rec., Vol. I, p. 126.

¶ Watson's Annals, Vol. II, p. 178.

In 1718, the authorities of Chester county erected the township of Conestoga, embracing all, or nearly all, of the present county of Lancaster. In the assessment for that year the inhabitants are enrolled in three classes, viz: English inhabitants, Freemen, and Dutch inhabitants. The first two classes contain forty-one names, and the latter seventy-eight, but among the latter are a few evidently of English and Welsh families who resided in the German settlement. West Conestoga was formed in 1720, and included all the territory of the mother township lying west of Pequea creek. Its inhabitants were chiefly Scotch-Irish. Two years later the name was changed to Donegal, in memory of the homes its people had left on the other side of the Atlantic. The township of Pequea, formed in 1721, included the settlements along the creek bearing the name. Before two decades had passed from the time the first Mennonites began their settlements, the population above the Octoraro had so increasd that a proposition to lay off a new county received many supporters. On the 6th day of February, 1729,* a petition of the inhabitants of the upper part of Chester county was laid before the Governor and Council, in which they prayed that a divisional line be made between the upper and lower parts of the county, and that the upper part thereof should be erected into a new county. On the 20th of the same month, commissioners were appointed to run and mark a divisional line. The commissioners' return was made on the 2d day of May, † and confirmed the same day, and the "upper parts of this Province" were declared to be erected into a new county by the name of "Lancaster." In order to provide for the establishment of courts, the action of the Council was laid before the Assembly, and on the 10th day of May following, ‡ an act was passed declaring "That all and singular the lands within the province of Pennsylvania, lying to the northward of Octoraro creek, and to the westward of a line of marked trees, running from the north branch of the said Octoraro creek, northeasterly to the river Schuylkill, be erected into a county, and the same is hereby erected into a county, named, and from henceforth to be called, Lancaster county." The people residing at and near points claimed to be eligible sites for the county buildings competed for the county seat, viz: Postlethwait's, a tavern six or seven miles south west from the present site of the city of Lancaster, Wright's Ferry, now Columbia, and Gibson's Tavern, now Lancaster., Postlethwait's was selected and the courts were held there on the 9th day of June, 1729, [*] and regularly thereafter until November sessions, 1730, [†] which were held at Lancaster, that place having been fixed upon by the commissioners appointed to select a permanent seat of justice.

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* **Col. Rec., Vol. III, p. 343.**

† ***Ibid*, Vol. III, p. 355.**

‡ **Smith's Laws, Vol. I, p. 176.**

York, [‡] the fifth county, which then included Adams, was erected from a part of Lancaster west of the Susquehanna, by an act passed the 19th day of August, 1749, and the next year, on the 27th day of January, all of Lancaster's remaining territory westward of the river named was erected into Cumberland, [‖] the sixth county. Berks, [§] the seventh county, made another cut into Lancaster's domain on the north-east, by act of the 1st day of March, 1752, and the creation of Northumberland, [¶] on the 21st day of March, 1773, still further curtailed her boundaries on the northward. On the formation of Dauphin, [**] the 4th day of March, 1785, she parted with another portion of her area, and by the act of the 16th day of February, 1813, creating Lebanon, [††] her territory was reduced to its present limits, embracing an area of nine hundred and twenty-eight square miles.

As the population increased, the wants of the people demanded better means of communication with Philadelphia and the older settled parts of the Province than the Indian trails afforded, and on the petition of inhabitants residing at and near Conestoga, setting forth the great necessity for a road to be laid out from Conestoga to "Thomas Moore's and Brandywine," the Council, on the 27th day of May, 1718, [‡‡] appointed viewers to lay out a road and to make report to the Council for confirmation. The road laid out under this authority, which received the designation of "Old Peter's Road," extended across the county from Salisbury township *via* Mount Joy and Donegal church to Conoy township. Parts of its route are yet used as a public highway. After the town of Lancaster had been laid out, the magistrates and grand jury united with the other inhabitants of the county in petitioning the Council for the appointment of viewers to lay out a public road from said town to the high road in the county of Chester leading to the ferry over the Schuylkill at High, now Market street, of the city of Philadelphia. The reasons set forth by the petitioners were: "That not having the conveniency of any navigable water, for bringing the Produce of their Labours to Philadelphia, they are obliged at a great Expense to transport them by Land Carriage, which Burthen becomes heavier thro. the Want of suitable Roads for Carriages to pass. That there are no public Roads leading to Philadelphia yet laid out thro. their county, and those in Chester county, thro. which they now pass, are in many places incommodious." This petition was read in Council on the 29th day of January, 1731, [‖‖] when viewers were appointed to lay out a road from the town of Lancaster to the line of Chester county, and another set to continue the route through that county, and the two boards were authorized to review said high road in Chester county, and report necessary alterations to the same. The viewers named did not perform the duties enjoined on them until the 4th day of June, 1733. Five days later they made report to the Council that they had laid out a road from Lancaster to the King's high road in the county of Chester, giving the several bearings and distances, and accompanied with a draft thereof, and on the 4th day of October following, * the return was approved and confirmed, and the road as laid out was declared to be the "King's Highway or Publick Road," and it was ordered that the same be forthwith cleared and rendered "commodious for the public service." The Council, on the 23d day of January, 1736, † on the petition of sundry inhabitants of the counties of Chester and Lancaster, setting forth the want of a high road from the remote parts of the counties in which they reside, and that a "commodious" one might be laid out from the ferry of John Harris, on the Susquehanna, (the lower end of Harrisburg,) to intersect the high road leading from the town of Lancaster, at or near the plantation of Edward Kennison, in the great valley, in the county of Chester, viewers were appointed to view the ground and lay out a road. The viewers made a return, dated the 17th day of June, 1736, and the Council, on the 24th day of March, 1737, ‡ confirmed the road as described in the report and draft, and declaring the same the "King's Highway," directed it to be forthwith cleared for the public service. This road passed through Brickerville, Ephrata, Blue Ball, and Beartown. Under the frame of government declared by William Penn, on the 25th day of April, 1682, ‖ the Governor and Provincial Council were invested with power "to appoint all necessary roads and highways in the Province." This power was re-affirmed in the frame adopted by the Proprietary, Council, and Assembly on the 2d of April, 1683.§ Under authority conferred by an act passed in 1700,¶ which authorized the justices of the county courts to appoint viewers to lay out roads in their respective counties other than king's highways, to confirm returns thereof, and direct the opening of such roads, many roads were located in various directions in the county as the convenience of the inhabitants demanded.

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[*] Ellis & Evans' Lanc. Co., p. 25.

[†] *Ibid*, p. 202.

[‡] Smith's Laws, Vol. I, p. 198.

[‖] Smith's Laws, Vol. I, p. 201.

[§] *Ibid*, Vol. I, p. 212.

[¶] Smith's Laws, Vol. I, p. 214.

[**] *Ibid*, Vol. II, p. 284.

[††] Smith's Laws, Vol. VI, p. 17.

[‡‡] Col. Rec., Vol. III, p. 43.

[‖‖] Col. Rec., Vol. III, p. 394.

The construction of the Philadelphia and Lancaster turnpike road, authorized by an act passed on the 9th day of April, 1792,** was a new departure in public improvements. This work, completed in 1794, cost $465,000, and besides being, to all who had occasion to use it, a great convenience, it proved remunerative to the stockholders, and stimulated the making of other turnpikes over principal routes of travel. Canal and slackwater navigation next engaged public attention, followed by the building of railroads which cross the county in various directions, affording easy means of communication and great facilities for the transportation of the products of the soil.

Until a little over a half a century ago, the operations of the husbandman were conducted according to primitive methods. Beginning with the introduction of the portable threshing-machine, about 1832,—a contrivance that excited wide-spread wonder,—the number of improvements made in farming implements and machines for abridging human labor in agricultural pursuits is almost incalculable. The use of reapers, mowers, horse-rakes, grain-drills, steam-threshers and separators, and other improvements of modern invention mark the progress of the county. It is sometimes remarked that the "times" are not as they were in the good old days of our fathers and grandfathers. The farmers of Lancaster county would not willingly, even in the matter of farming implements alone, go back to those good old days of wooden mould-boards, the sickle, and the flail. The crops that are now produced in this county could not be planted, harvested, and prepared for market by the present farming population if the old methods prevailed.

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* Col. Rec., Vol. III, p. 520.

† Col. Rec., Vol. III, p. 620.

‡ *Ibid*, Vol. IV, p. 181.

‖ Hazard's Annals, p. 563.

§ Duke of York's Laws, p. 157.

¶ Duke of York's Laws, p. 285.

** Smith's Laws, Vol. III, p. 82.

As early as 1787, efforts were made to organize an agricultural society. Various organizations looking towards the improvement of farming methods were formed from time to time, and resulted in great good, not only to the participants, but to the general public. The "Lancaster County Agricultural and Horticultural Society," which has been represented in this Board for several years past, was formed in 1867, and was subsequently incorporated by the court of common pleas of the county.

The cultivation of tobacco received early attention in this county, but not until in the third decade of the present century was much attention bestowed upon that branch of agriculture. From that time forward, the acreage was gradually increased. By the census of 1850, the production was given at 1,400,000 pounds; 1860, 2,001,547 pounds; 1880, 23,946,326 pounds. The last United States census (1880) reported in this county 9,070 farms, ranging from under three acres to over one thousand acres, giving an average area of a little over sixty-one acres in each. These farms, having an aggregate area of 556,314 acres, were valued at $69,004,919, and had thereon, in addition, live stock valued at $4,605,945, and farming implements valued at $2,210,393. Nearly three-fourths of these farms are cultivated by their owners. Some of the products for the year 1879 were : 3,381,046 pounds of butter; 100,991 pounds of cheese; 3,293,292 bushels of corn; 1,412,694 bushels of oats; 1,929,767 bushels of wheat; 6,580 tons of flax straw; 117,059 tons of hay; 4,299 bushels of clover-seed; 1,911,126 dozen of eggs. In the manufacture of cigars, 462,911 pounds of tobacco were used in 1879 and 18,309,420 cigars produced in the city of Lancaster, Manheim also produced over twelve million cigars during the same year. The assessed value of taxable real estate in 1884 was $83,199,204. The central part of the county is crossed from east to west by a broad belt of limestone, giving a soil of unsurpassed fertility. This, under the painstaking care of successive generations of industrious, intelligent, and thrifty farmers, has been continually kept in the best productive condition while yielding abundant rewards to the labor of the husbandman, and adding to the general store of wealth.

The first United States census, taken in 1790, gave the county a population of 36,147, which had increased in 1880 to 139,447, contained in one city, eight boroughs, and forty townships. The incorporated towns had inhabitants as follows:

Lancaster city,	25,769
Adamstown, borough of,	701
Columbia, borough of,	8,312
Elizabethtown, borough of,	980
Manheim, borough of,	1,666
Marietta, borough of,	2,503
Mount Joy, borough of,	2,058
Strasburg, borough of,	1,005
Washington, borough of,	700

Of this population of 139,447, only 7,065 were foreign born, and of the 132,382 native Americans, 129,634 were born in Pennsylvania. Of the foreigners, five sevenths were immigrants from the German Empire.

There were 1,437 manufacturing establishments in the county in 1880, with a capital of $10,481,798, employing 8,840 hands, with an output of products valued at $14,809,330. The values of the products of three of the leading industries were as follows: Flouring and grist-mills, $3,816,170; iron and steel, $2,663,223; cotton goods, $1,654,132.

The manufacture of iron in this county was commenced about the middle of the last century. In 1742, William Branson, *an Englishman, then one of the owners of Reading furnace, bought a tract of land on Conestoga creek, near Churchtown, in Cærnarvon township, and built Windsor forge thereon in 1747. This was soon followed by a second of the same name. Subsequently, Lynford Lardner, whose name was familiar in provincial days, became one of the owners of the property. John Huber, †a Pennsylvania German, about 1750, built Elizabeth furnace, on Middle creek, a branch of Conestoga, near Brickerville. In 1757, he sold the furnace to Baron Henry William Stiegel, a native of Manheim, Germany, who built a larger one. Here Stiegel carried on the manufacture of six-plate stoves for burning wood, the only fuel then known. He afterward increased the number of plates to ten. A few of his stoves bearing peculiar inscriptions are yet to be found among the farmers of the county. Stiegel becoming financially embarrassed, his furnace was sold, and it came into the possession of Robert Coleman, ‡under whose management and that of his descendants its operations were continued until 1856, when scarcity of wood caused its final abandonment. Other furnaces and forges were established from time to time at eligible points in the county.

The "Gap" mines were worked for copper in the early part of the last century and at intervals down to about 1852, when it was discovered that the most valuable deposit in the mines was nickel, which has since been produced in considerable quantities.

It has been claimed that the first school in the county was opened by the Seventh Day Baptists at Ephrata, in 1733. In 1740, Ludwig Hacker, one of the brethren, opened there the first Sunday-school in America. Singing schools were begun there in 1742. The Moravians at Lititz opened a school sometime after their settlement in Warwick, in the first half of the last century. The institution now known as Linden Hall Seminary was opened in 1794. The Reformed and Lutheran churches also established schools at an early date. On the 10th day of March, 1787, the General Assembly incorporated the German College and Charity School of Lancaster, to be called "Franklin College." Under an act passed in 1850, Marshall College was united with it, and the institution now bears the title "Franklin and Marshall College." The common-school system, introduced in 1834, and remodeled in 1854, has become one of the fixed institutions of the Commonwealth, and, although accepted with some reluctance by a portion of the German element, has now its cordial support. The earliest circulating library of the county was founded by Thomas Penn about 1765, and was named the "Juliana Library," in honor of his wife.

Newspaper printing was introduced in 1751 by Miller & Holland, who issued at Lancaster a German and English paper. The "*Intelligencer*," commenced in 1799, is the oldest surviving paper of the county, and, reckoning from the founding of the *Journal*, which was consolidated with it in 1839, the establishment has had a continuous existence since 1794.

In 1880, there were issued in the county, three dailies, twenty-one weeklies, seven monthlies, and one quarterly. The "*School Journal*," devoted to the interests of the public schools and education generally, was established in 1852.

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* United States census, 1880, Vol. II, p. 74.
† United States census, 1880, Vol. II, p. 76.
‡ United States census, 1880, Vol. II, p. 76.

It is not generally known that a large part of the public printing for the provincial and State government for many years prior to 1808 was executed by Francis Bailey, at his printing office in Sadsbury township. His imprint can be found on copies of the laws, journals, and other official documents.

In the Revolution, the war of 1812, the Mexican war, and the late rebellion, citizens of Lancaster county bore a conspicuous and patriotic part. On the very day that the Continental Congress in Philadelphia adopted the Declaration of Independence, a military convention, representing the fifty-three battalions of the Associators of Pennsylvania, met at Lancaster to choose two brigadier-generals to command the forces of Pennsylvania in the struggle then impending. Daniel Roberdeau and James Ewing were elected. The latter was born in Manor township about the year 1736.

A large number of Lancaster county's native or adopted citizens filled, from time to time, conspicuous civil positions under the colonial, State, and National Government. Among these may be named: George Ross, member of the Continental Congress, and a signer of the Declaration of Independence; George Ross, junior, vice president of the Supreme Executive Council, 1788–1790; Jasper Yeates, Justice of the Supreme Court, 1791–1817; James Buchanan, member of Congress, 1821–1831, Minister to Russia, 1831–1833, United States Senator, 1833–1844, Secretary of State, 1845–1849, Minister to England, 1853–1856, President of the United States, 1857–1861; Molton C. Rogers, Secretary of the Commonwealth, 1823–1826, Justice of the Supreme Court, 1826–1851; Simon Snyder, Governor, 1808–1818; Thomas H. Burrows, Secretary of the Commonwealth, 1835–1839, and Superintendent of the Public Schools, 1860–1863; James P. Wickersham, Superintendent of Public Schools, 1866–1875, and Superintendent of Public Instruction, 1875–1881, Minister to Denmark, 1882; George B. Porter, Adjutant General, 1827–1829, and Simon Cameron, United States Senator, 1845–1849, 1857–1861, 1867–1877, Secretary of War, 1861-1862.

Edward Hand, a skillful physician, became one of the most conspicuous generals in our Revolutionary struggle, and General Henry Miller served with great credit in both our wars for independence. Rev. Henry Muhlenberg was an eminent clergyman, and author of several works on botany. David Ramsey, a native of Drumore township, a well-known historian, became a citizen of South Carolina, and died there. Robert Fulton, to whom the world is indebted for the successful application of steam for the propulsion of vessels, was born in the southern part of the county, where a township, that includes his birth-place, was named in his honor. In medical literature, the names of Barton, Eberle, and Atlee are justly entitled to the high rank awarded them.

This paper having now reached its allotted limits, it will be closed by a brief reference to some of the local names of the county. It is creditable to the early inhabitants that they preserved the euphonious names of the principal streams, viz: Conoy, Chiquesalungo, Conewago, Conestoga, Pequea, Conewingo, and Octoraro. Three of these, Conoy, Conestoga, and Pequea, are perpetuated in the names of townships, and of the other township designations, many of which were suggested by the first settlers in remembrance of the homes they had left across the Atlantic, Bart, Little Britain, Salisbury, and Warwick can be traced to England; Brecknock, Cærnarvon, and Lampeter to Wales; Colerain, Donegal, Drumore, and Rapho to the North of Ireland; Manheim to Germany, and Strasburg to the Franco-German border.

CELERY CULTURE AND ITS PROFITS.

By G. HIESTER, *Member from Dauphin.*

Celery is a crop that requires great care and skillful manipulation from the time the seed is sown until the perfectly blanched stalk is taken from the ground ready for the table, and no careless, slipshod farmer should ever undertake its cultivation.

The seed should be thinly sown in drills, in rich mellow ground, as early in April as possible; and, as it does not germinate readily, it should be covered by rolling the ground thoroughly with a garden roller or patting it with a spade. As soon as the rows can be traced, the ground should be lightly worked between the rows with a hoe or steel rake, so as to prevent any weeds from starting. The beds should be kept clear of weeds and well worked until the plants are ready to be set out, and as they grow, they should be shorn once or twice to make them stocky. The strongest plants will be ready to set out in the field by the first of July, and the planting can be continued at pleasure during the month. There is little gained in this section of country by raising plants in a hot-house and setting out early in June, as the plants require a cool, moist atmosphere for their growth, and those set about the middle or latter part of July, after the nights have become cool, often outgrow those set during the hot, dry weather of June.

There is great difference of opinion as to which is the best way to grow celery. I think that where the operator is cramped for room, and wants to get as much as possible off of a small piece of ground, the old way of planting in trenches from six inches to a foot deep is probably the best, although it requires more labor.

These trenches are generally prepared by making a deep, wide clear-up, or dead furrow, with the plow, then running through this with a triangular drag made of three boards, like the ordinary snow plow, which makes the trench the desired width and levels up the bottom.

As the main object is to introduce rapid growth of the plants, this bed must be highly enriched, either with well-rotted barn-yard manure or some good artificial fertilizer, or both, the whole well mixed and pulverized by stirring two or three times with a one-horse plow; the last time it should be thrown towards the center and raked down like an ordinary garden bed, leaving a path on each side a few inches lower than the bed; these paths serve as gutters to carry off the surplus water in case of a heavy dash of rain, such as we frequently have in July and August, and prevent the washing of sand over the plants, which often occurs when the bottom of the trench is left perfectly flat from side to side. These beds are generally from three to four feet wide and hold from six to eight rows.

When the bed has been thoroughly prepared, it is marked off by lines running lengthwise, six inches apart, and crosswise, one foot apart. The plants are set at the points where the lines cross. As soon as the plants have taken a firm hold of the ground, which will be in about a week or ten days, the beds should be carefully hoed to prevent weeds from starting and to encourage the growth of the plants. As soon as possible after every rain the hoeing should be repeated.

About the middle of August, filling up for blanching should commence, and this is the most important operation of the season, for, if the work is carelessly or improperly done, the whole crop will be spoiled. First, the celery must be handled—that is, a little ground is thrown in between the rows, the leaves are then carefully and gently drawn together in an upright position and held thus with one hand, while the loose ground is drawn up and pressed firmly against the stalk on all sides with the other, after which ground is shoveled in and leveled up between the rows to the height of the center or heart leaf. Care must be taken not to cover up the heart, as it is very tender, and, if covered with ground, will double under and form a gnarled and deformed stalk.

As the celery grows, this banking up must be continued every week or two until the crop is either taken out for market or laid up for winter, of which we will speak hereafter.

This is the old method, and it is still practiced to a great extent by small gardeners where economy of space is an object, but where this is not so much a consideration as economy of labor, the single-row method adopted of late years by Peter Henderson and nearly all the leading market gardeners near our large cities will probably prove more profitable.

In this, the plants are set on the level in single rows, six inches apart in the row, and the rows from three to four feet apart. When the plants are set, it is customary for the operator, when he has finished planting a row, to turn back and tramp them in with one foot on each side of the row, just as though he were tramping a garden path, then level up by running along the row with a steel rake. When this is carefully done, the percentage of plants that fail to grow is very small.

This patch is then worked with the one-horse harrow and cultivator until banking time arrives, when it is handled just the same as when planted in a trench; but the ground, instead of being shoveled up, is thrown up with a light one-horse plow. An expert plowman will do this work just as accurately, and in much less time, than it can possibly be done by hand; thus doing away with the most laborious part of the work.

Celery that is intended for late winter and spring market is only banked once, and then allowed to grow rank and green until the time comes to lay it up for winter. That part of the crop that is intended for fall and early winter market must be blanched as it grows. It can be banked twice with the plow and hoe, but the last time the shovel must be used, as the plow will not throw the ground high enough.

About the first of October, the largest and strongest rows are taken up and placed in trenches about nine inches wide, and just as deep as the celery is long; so that, when the ground is nicely leveled up, the tops of the celery shall be just on a level with the surface of the ground.

These trenches must be dug on high, well-drained ground, or the celery will rot. The stalks are packed in these trenches as closely as possible, and the tops left open. At this season of the year, it will blanch nicely in a couple of weeks, and the first will be ready for market by the latter part of October; and from this time until late in the spring, the trenches will yield a succession of tender, crisp, nicely blanched celery, it being always borne in mind that the more perfectly it has been blanched as it grew, the shorter time will be required to finish the process in the trench, and the shorter time it can be kept thus stored without rotting.

That portion of the crop which is wanted for use during the winter is taken up about the second week in November, when there is no danger of the ground freezing up, and is placed in trenches as described above, except that the trenches must be covered to prevent freezing.

Peter Henderson, in his valuable work, "Gardening for Profit," recommends covering with leaves, lightly at first, and as the weather gets colder, gradually increasing the covering, until it is about two feet thick. I have never succeeded well by this method, but prefer making a board roof over the trench by nailing two boards together, cone shape, and covering with about a foot of ground, which can be thrown on very rapidly with the plow and shovel.

In trenching celery either for blanching or for winter, it is of great importance that the trench be narrow; in no case should it be more than ten inches wide, as the plants require a certain amount of moisture to keep them crisp and prevent their heating. Experience has shown that a trench of this width will supply the proper amount.

When grown in the old way, the plants can either be dug when cold weather sets in and stored in narrow trenches, or can be banked clear to the top with ground, and the whole covered with coarse litter to prevent freezing. For a large patch, this will require more material than the grower can furnish; and for this reason, and the additional reason that blanched celery does not keep so well during the winter as green, the bulk of all the celery grown in this way is marketed as early in the fall as possible, and only a small portion of the crop is secured for winter use.

I have now described the two leading methods of growing celery; and before going farther, wish to call special attention to the following points, which I have endeavored to make prominent, and on which I consider success largely depends:

To secure the speedy germination of the seed, roll the ground well when it is sown.

To secure good stalky plants, keep the bed clear of weeds; if too thick in the row, thin while young, and shear the plants whenever they show rank growth.

To promote rapid growth when planted, have the ground highly enriched, thoroughly pulverized, and keep well worked.

To grow fine, straight stalks, handle carefully, never work when the leaves are wet, either with dew or rain, and keep constantly banked up to a level with the heart leaf.

Celery wanted for early market must be blanched as it grows; that which is to be kept for winter and spring, must be stored green.

In storing for winter, avoid packing in large masses, and cover so as to prevent the crop from all danger of freezing.

If these instructions are observed, and you have a favorable season, you may be assured of a good crop.

The dwarf and half-dwarf varieties are principally cultivated, because they require much less labor in banking, and yield about the same weight of edible celery per acre as the tall kinds, and, as a rule, are more solid.

The profits of the crop depend so much upon the skill and good management of the cultivator that it is difficult to state in figures what they are likely to be.

Peter Henderson, of New York, one of the oldest and most extensive market gardeners in the country, claims that it has yielded him a profit ranging variously from fifty dollars to one thousand dollars per acre. It is very easy to figure the latter profit on paper, as the average number of plants grown on an acre is thirty thousand, and the price ranges from three cents to ten cents per stalk, while the cost of growing, when properly managed, will not exceed one hundred dollars per acre. But there are so many casualties likely to occur between planting and selling time that this apparent profit is usually much reduced. Every plant that is set out does not reach the market.

The seed, although very carefully selected, may produce some plants that are hollow; these are a dead loss. Through careless planting, a great many plants may die, or, although they live, may produce only weak, sickly stalks; these, of course, are lost. Through careless handling while growing, other plants may be injured so as to be worthless, but by far the greatest loss occurs through mistakes made in storing for winter. If grown in the old way, the cultivator may put off the last filling one day too long, and have the tops badly nipped by frost, which will injure the sale of the crop just in proportion to the length of stalk damaged; or he may put too light a cover of litter over the bed—as was the case with several of my neighbors last winter—and, an unusually cold snap coming on, the entire bank froze solid and all the celery contained in it was destroyed. In following the new plan, he may make his storage trench too wide; a part of his crop will heat and be ruined; mice may get into his trench, and, if not discovered, will destroy all the celery contained in it; or, having it covered nice and warm to protect it from a severe winter which he expects, a warm, murky spell often occurs, which draws the frost out of the ground and the celery rots rapidly, unless it is put up in such shape that the trench can be ventilated—and fortunate is the man who can carry his entire crop safely through all danger and get it to market in good condition. From this, we can readily see that, in order to reap the greatest profit, the cultivator must not only be a skillful workman, but he must look carefully ahead and guard against all the various chances of loss, and, just in proportion as he is able, by good judgment and accurate knowledge, to protect his crop from harm after it is grown, so will his profit be.

Celery is grown in this State principally as a second crop, and is especially desirable for this reason. As there is no advantage in planting before the middle of July, it can follow early potatoes, peas, beans, cabbage, beets, onions, or sugar corn, and, with the aid of a good season, a man must be a poor manager, indeed, who cannot make celery, as a second crop, pay him well for his trouble.

I think the farmers of Lancaster county would find it greatly to their advantage if they would plant at least half their tobacco land in one of the early crops mentioned above and follow with celery.

THEN AND NOW.

By J. ANDREW WILT, *Secretary Bradford County Agricultural Society.*

It is said that "there is no royal road to knowledge." So, also, can it truthfully be said that there is no royal road to successful farming.

We boast of our civilization and enlightenment of our progress in the sciences and mechanic arts; and in this essay I shall try to briefly sketch, in a general way, the progress made in agriculture.

By being reminded of the past, and calling attention to the present, and thus see it as it was *then* and is *now*, we hope to draw a few useful and practical lessons for the future.

I shall not attempt to give a history of agricultural progress from time "immortal;" nor will I even refer to those things and the time "whereof the memory of man runneth not to the contrary;" but will limit the time and mention those things only which are within the recollection of many persons present.

I venture the assertion that there are persons present who can recall the time when wooden mould-boards on plows were in use. Many others remember the wrought-iron points on plows.

The instrument then called a plow was so unfit for the purpose, when compared with our modern, new-fangled iron beam, chilled iron, chilled steel, reversible sulky plow, and plow sulky, that we now consider the name a misnomer. *Then* the depth of the furrow depended more upon the muscular action of the plowman in pushing up on the handles and down on the point. *Now* it depends on the setting of a contrivance on the beam, to prevent the plow from turning over the whole field at once.

Then the farmer pulverized the soil as best he could with the "V" shaped harrow, with a dozen or less wooden teeth. *Now* he does it effectually by riding over his fields in a two-wheeled chariot, and with the same feeling of pride and glory that we imagine the ancient warrior must have felt when he went into battle with his armored horses and his speared war cart.

Then he threw a bag, with a bushel of grain in it, over his back and walked over his lot sowing it broad-cast. *Now* he pours the grain into his seeder, and he sees it no longer until it appears in little rows coming up as even and regular as if placed there by measurement. *Then* he planted his corn by dropping so many kernels in a hill and covering it with a very clumsy home-made instrument, called a hoe. *Now* the corn-planter is so perfect that it counts the kernels, drops them, and covers them at the same time. *Then* the sickle and a rude cradle were used for cutting the grain. *Now* the machines cut, rake, and bind, and one man and team of horses can do the work of ten men formerly.

So, also, with cutting grass and making hay. The old soft grass-hook, called the "Dutch scythe," that was sharpened by pounding, was supplanted by the patented scythe, which was a great improvement. *Now* few scythes of any kind are used; and those used are only put in requisition to cut the grass out of the fence corners and around the apple trees. The grass, when cut into swathes, had to be scattered to dry and again raked up by hand. *Now* it is cut with the improved machine, remains scattered until sufficiently cured to be gathered up with the modern wheel rake, and with the new hay loaders, carried on the wagon.

In those times, it was necessary to keep your best and strongest man to "pitch off" the hay in the barn. *Now* the poorest horses on the farm do that, and mow it away, too.

Years ago the farmers generally did not take the care in the selection of seed that they do now. Then many farmers had an idea that corn would produce corn; rye, rye; and wheat, wheat, regardless of the kind or quality sowed.

By this means, however, it was discovered that a good crop of chiss and cockle could be grown from poorly prepared ground, and a still poorer quality of wheat sowed.

Farmers generally have lived and learned to exercise greater care in the cultivation and selection of seed. With the knowledge the farmer now has of the soil he cultivates, of fertilizers, kind and quality of seed sowed, he is almost sure of a crop, and a failure is due mostly entirely to the conditions over which he has no control.

The farmer or agriculturist has, in fact, been progressing in everything that pertains to his occupation, while in some of the professions the ancient forms are still used, and the semi-barbaric or half-civilized nations have still among them adherents.

The farmers of this country have not only advanced in material progress, but have, in general intelligence and educational qualifications, been making equally as rapid strides.

Such a thing as an agricultural paper devoted to the interests of the farmer was then not known, and if it had been, would have had a very limited circulation. Since then papers and periodicals devoted exclusively to the interest of the farmer are published by the scores, and the effect of these periodicals upon the agriculturist of our land has been wonderful.

Then many of the farmers were governed and controlled by *signs*, *whims*, and *superstitions*.

Then it was because of the *sign* that they did or did not the work.

Now, it is because of the *reason* that they do or do not.

This intellectual advancement has been made by reason of better school facilities and the publication of books and periodicals, and read by the farmers of this land.

Then there were a few only who read and studied as well as worked. *Now* the *mass* of farmers throughout the land are intelligent, and generally well posted in all that pertains to their chosen occupation.

I have neither time nor inclination to present statistics in proof of these changes, but the facts are apparent to all who think, observe, and compare.

The life of a farmer is no longer that of a "drudge." While he must be industrious, active, energetic, and in fact work hard at times, it is no longer that monotonous "day in and day out" drudgery it was years ago. There is now more variety in farming.

The general improvement in attainment of the farmer, in implements, the demands and facilities of this country now afford the farmers opportunities for specialties in the work.

Need I mention the change and improvement in the habits and modes of life of the farmer? Shall we go into the kitchen and compare the kind and quality of the food used *then* and *now*? Shall we sit on the old-fashioned straight-backed chair of our grandfather's time, or shall we sit on the easy, cheap, modern chair? Shall we stay all night with the *then* farmer and sleep in the old-fashioned rope bedstead and home-made linen sheet, or shall we stay with the *now* farmer and sleep in the bed with patented springs, and mattresses, and soft woolen or cotton sheets?

Instead of his "linsey woolsy" which he then wore, he now buys more yards of flannel, at a less price, from the money he receives for sale of the wool of his sheep.

The farmer *then* did not understand the philosophy of stock-raising as well as the majority do now. *Then* the advantages of the short-horned, the Jersey, the Holstein, and Devons were not so well understood as now.

Then the tendency was to believe that a cow was a cow; an animal with wool was a sheep, and anything that grunted, a hog. Now the intelligent farmer examines whether a cow be of the short-horned, the Jersey, or other breeds, according to his wants, whether for beef, or for milk and butter, etc.

Then the native hog, with Hambletonian body and legs, capable of going a mile in three minutes when pursued by neighbors' dogs, mostly prevailed.

Then it seems it was deemed necessary that a hog should have a long nose, on the principle of "root hog or die."

Now all these things have changed. Instead of the small-bodied, long-legged, and long-nosed hog, the farmers have short-legged, small-eared, and short-nosed kinds.

Instead of wishing trotters, the farmers have learned that pork, bacon, shoulders, ham, and sausage are more profitable than bones, pigs' feet, and ears.

A heavier and better class of horses are now being generally bred by the farmers. A large, strong, active horse is undoubtedly needed on a farm, but we fear that the heavy, clumsy Percheron and Clydesdale are not the kind of horse our general farmer needs. The heavy-draught horse is needed in our cities, for lumbering, and in the quarries, but for the common farm horse, where it is necessary to use him on the plow, the wagon, the spring-wagon, and to drive to town, we think he will prove less valuable than a horse of more activity and less weight.

The intelligent farmer has also learned that stock well-stabled, fed, and watered during winter is worth more than stock allowed to run in the yard, with little or no shelter, with the feed thrown on the snow or ground. The farmers of to-day have learned by the experience and observations of those gone before, and are building and arranging their barns and sheds with a view to a proper, as well as a profitable, care of their stock.

The growing of fruits and vegetables, the mode and manner of keeping and preserving the same by the farmers is still another evidence of the progressiveness of the farmer.

One of the instruments in producing all these changes to which we have alluded is the fairs and exhibitions held by agricultural societies.

How often do we hear it quoted that "competition is the life of business." So, also, is honest fair competition at the county fair the life and success of the farmer.

At the fair the farmers have a chance to learn, and if they will, improve and progress. There they can learn of the quality of seeds to sow, the cows most profitable to keep. There he can see, side by side, the different kinds of sheep, swine, poultry, etc., and he can determine which kind would be most profitable for him.

Where is the farmer that does not desire to excel? This disposition is laudable, and has made much of the change and improvements mentioned. County fairs help to make the farmers as much as the farmers help to make the fairs; therefore, as the fairs improve in usefulness, so will the farmer improve as a practical farmer; as the farmer progresses in all that pertains to his occupation, so will the county fair continue to be a means of still greater progress among the agriculturists.

Permit me to mention the fact that when managers of fairs which are supposed to be in the interest of the farmer devote one-half or one-third of the time of an exhibition to trotting, racing, and kindred sports, they are not endeavoring to educate the rising generation in habits which will be of benefit to them in after-life, as farmers or otherwise, or even in cultivating in them a taste for the pure, the high, and the lofty. We believe that it has been clearly demonstrated that a fair can be made a success in every respect, profitable to the exhibitor and the association, without the stimulus of a horse-race.

This meeting of the officials of the Commonwealth and representatives of the agricultural societies, which, under our law, constitute the State

Board of Agriculture, is another monument to the progressiveness of the agriculturist, and, if properly conducted and wisely sustained, will prove one of the agencies through and by which still greater good may be accomplished.

With all this advancement and progress made, we are but beginners. The farming of the past and present has been too much of an experimental nature. We have been learning facts without the reasons or causes.

We, to-day, know more of the *effect* than the *cause.*

We have been better observers of facts than at learning the *reasons* producing them.

The future looks bright and promising. The agriculturist of fifty years hence will have more to boast of than we now have. He will then have progressed so rapidly that the principles of farming will be reduced to as exact a formula as chemistry now is. He will then be able to analyze his own soil, each field in his farm, and know exactly what kind of grain or crops it will produce, and what is necessary to add to produce other kinds of crops.

Wonderful discoveries will be made in the near future. Science and invention will come to the aid of the agriculturist. Perpetual motion, or aërial navigation, may not be successfully accomplished; but we believe that forces in nature will be controlled, and thereby enable the agriculturist to produce conditions which will revolutionize many of the notions and ideas of the people of to-day.

Let us not have too much reverence for the things and ideas of the past. Let us hold on to that which is good; and with the eye of progress and advancement, grasp the new.

Let each man try and be of the advance guard of this mighty force of progress and enlightment sweeping over this broad land.

OLEOMARGARINE AND IMITATION BUTTER.

REPORTS, ESSAYS, AND DISCUSSIONS CONDENSED FROM THE PROCEEDINGS OF THE ANNUAL MEETING OF 1885.

The President (Hon. R. E. Pattison) having called for the reports of the standing and special committees, Eastburn Reeder, chairman of the Committee on Dairy and Dairy Products, presented the following report:

At the autumn meeting of the State Board of Agriculture, held at Bedford, the Committee on Dairy Products submitted drafts of two bills for the protection of dairymen, which were read, and after hearing the Hon. W. P. Richardson, of Orange county, New York, in explanation of the New York law, the further consideration of the subject was postponed until the annual meeting. One of these proposed laws was *prohibitory* in its character, and in its main features resembled the New York law; the other was *regulatory* in its nature, requiring the manufacturer and seller of imitation dairy goods to brand and sell their products under their true name and with an analysis of their composition, as is now required by the law regulating the manufacture and sale of commercial fertilizers. Since the last meeting of the Board, still another plan has been developed, which may be termed the *high license* system, as is proposed by the State of Vermont. This plan proposes licensing the manufacture and sale of oleomargarine and all other imitation dairy products, and by placing the license fees or taxes so high that the stuff cannot be made and sold at a profit. All of these three different plans or methods have their advocates among farmers and dairymen, and it now becomes the province of this Association to decide which should be adopted, and which the Legislature should be asked to pass.

A brief synopsis of these different proposed laws will first be given, to get a clear understanding of them, and then the arguments for and against should be considered. Do we need a strictly *prohibitory* law, like the New York law? Will a law *regulating* the manufacture and sale, requiring the stuff to be sold under its true name, or would the high license system, taxing the article out of existence, be the most likely to accomplish the desired object? These are the points for us to consider. It has been objected to the New York law that it is unconstitutional; that it would not be passed by the Legislature of our State. Why is it unconstitutional in this State? Is it because it is prohibitory, or is it because it provides for a State appropriation and the appointment of a dairy commissioner to see that the provisions of the law are enforced? It certainly cannot be the former, because section six of the New York law, which is said to be an exact copy of the Missouri law, is strictly prohibitory, and its constitutionality has been affirmed, not only by the Supreme Court of the State of Missouri, but by the Supreme Court of the United States. Even the combined ability of such eminent counsel as Evarts and Conkling could not gain a decision against the constitutionality of the law. In the State of New York, the Supreme Court has decided in favor of the law, and it now goes up to the court of appeals, the highest tribunal in that State. Dairymen in all parts of the country are anxiously watching the fate of the New York law.

In order to elicit information upon these points, your committee have propounded questions and sent them to men who deal largely in dairy products. The following are some of the questions and the answers received:

First. Has the manufacture and sale of "imitation butter" lessened the price of genuine butter, and if so, to what extent? *Answer.*—It is the universal opinion of dealers in Philadelphia that "imitation butter" has lowered the price of the genuine article at least ten cents per pound—twelve cents would be nearer the truth.

Second. What are the relative proportions of "imitation" and genuine butter sold in Philadelphia since the 1st of October, 1884? *Answer.*—It is the general opinion that oleomargarine, suine, butterine, &c., manufacturers supply *nearly one half* of the entire stock consumed in this market. This answer goes on to state that the most of this stock is placed by men at a salary of ten and twelve hundred dollars a year, who drum the market from one end to the other, and we commission men who pay taxes and rents have to sit and do nothing. In other words, five or six concerns of New York and Brooklyn supply at least one third of our jobbers and retailers.

Third. Why, in your opinion, did the oleomargarine law of 1877 fail to accomplish the object for which it was enacted? *Answer.*—As regards the inefficiency of the law of 1877, we think it consists in its not having made any provision for its enforcement. There is no house that cares to spend time and money to see that the law is enforced. The Legislature should appropriate a certain sum of money, and appoint commissioners to look after the offenders. In short, we believe that such a law as they have in New York, making the State responsible for expenses incurred, the same as for punishing other offenders, would be the best thing that could be done. Anything that is done must be positive and severe, then these people will not care to tamper with the law, even should there be a doubt as to its constitutionality. In our judgment, the only thing that will prove effectual is a sweeping prohibitory law—just such as they have in New York and New Jersey. McGann, who was beaten in the courts of New York, has come to Philadelphia, and has a large factory nearly ready to open. Our opinion is, that should the Legislature pass a regulatory law, it would lead to endless trouble and no good results. If wiser counsel should deem it not best to pass such a law as they have in New York, then a licensing law, with a tax high enough to make it unprofitable to sell, and thorough provisions for its enforcement, would be the next best thing. Our firm will do all they can to assist you in securing the passage of any law you may think best to frame. We have consulted with the trade here in this city, and find them about ripe for a stubborn fight against the traffic in bogus butter.

Mr. John I. Carter, of Chester county, in a recent letter to the *American Dairyman*, takes strong ground in favor of a prohibitory law. He says: "I belong to an association representing twenty or twenty-five creameries, and behind us are at least one thousand dairymen. Since the confirmation of the New York law by the Supreme Court of that State, we are still more convinced that a prohibitory law is what we want. An attempt to *regulate* such a business (as you and Judge Pratt suggest) would be as unavailing as to try to regulate highway robbery. We already have tried it in our State, and it is a lamentable failure. The whole business of bogus butter making and selling is fraudulent and deceptive. It is not an honest business, and begets dishonest dealings. I can take you through the Philadelphia markets to-day, and defy you to point to a single pound of this stuff being *sold to a consumer for what it is.* Judge Pratt, in his minority report, makes two palpable misstatements. *First.* That this legislation was to protect a *special class*—the dairymen. With as much reason he might say that a law against horse-stealing was to protect horse-raisers. *Second.* He says: 'This prohibitory law interferes with legitimate competition.' He ignores the fact that this product does not sell on its own merits, but because it resembles butter, and the closer the imitation, the better it sells. Deception and fraud follow this business inseparably, hence it is not an honest business, entitled to the support of law."

In addition to the twenty samples of butter furnished last May to Dr. Leffman for chemical analysis, and of which report has already been made, your committee made, December 1, 1884, another collection, in a similar manner, of twenty samples more, which also were turned over to Dr. Leffman for analysis. These samples were numbered from one to twenty, and the chemist had no information as to where the samples were bought, by what name sold, or the prices paid.

Sold for Butter:

	Price per lb.
No. 1—Bucks county creamery,	$0 35
2—Bucks county creamery,	35
3—Bucks county dairy,	40
4—Girard avenue market,	35
5—Second street market, above Fairmount avenue,	25
6—Red Lion market,	34
7—Union market, Second and Callowhill streets,	25
8—Creamery butter, (grocery store, Market street, below Second,)	35

Sold for Butterine:

9—McGann's butterine, (Brooklyn, N. Y.,)	16
10—Reafferty's butterine, New York,	16
11—Nathan's butterine,	16
12—Hughes, Cook & Co.'s butterine, Philadelphia,	16
13—Robinson's butterine, Illinois,	16
14—Richard's butterine, Illinois,	16

Sold for Butter:

15—Lebanon county creamery, (Twelfth street market-house,)	40
16—Pennsylvania tub butter, June packed, (Twelfth street market,)	30
17—Ohio creamery, Farmers' market, (below Twelfth street,)	30
18—Bradford county roll-butter, Farmers' market, (below Twelfth street,)	30
19—Richardson's creamery, (Fifth street market-house,)	25
20—Sharpless' creamery, (Fifth street market-house,)	50

The following is the result of Dr. Leffman's examination of the twenty samples of butter:

Nos. 1, 2, 3, 4, 8, 15, 16, and 20—eight samples—good.

Nos. 5, 6, 13, 14, 17, 18, and 19—seven samples—marked doubtful.

Nos. 7, 9, 10, 11, and 12—five samples—marked bogus.

Making altogether twelve samples either bogus or of very doubtful purity.

Eight out of twenty samples selected were good, and the remaining twelve were either spurious or of a very doubtful character. It must be remembered that mixtures of genuine butter with lard, oleomargarine, or other fats may be made and sold, and, in the present state of chemical analyses, it is almost, if not quite, impossible to detect them. These mixtures would come under the title of doubtful, the results being such that while one would not be willing to purchase them as good butter, yet the figures would not be positive enough to permit an expert to testify as to their spurious character.

As a portion of their report, the committee presented drafts of three bills, of which the following is a synopsis:

ACT No. 1.—PROHIBITORY LEGISLATION.

TITLE.—"An act for the protection of dairymen, and to prevent deception in the manufacture and sale of dairy products."

Section one imposes a penalty of one hundred dollars for the sale of "unclean, impure, or adulterated milk," and fixes the standard of milk at twelve per cent. of solids.

Section two imposes a penalty on any skimmed milk which will not show, by a chemical test, at least eight per cent. of solids, and makes it obligatory that all cans containing skimmed milk shall have the words "Skimmed milk" on the top of the cans, in Roman letters not less than half an inch long; penalty, from fifty to one hundred dollars.

Section three prohibits the manufacture or sale of imitation butter or cheese, and for a violation of its provisions imposes a fine of from one hundred to five hundred dollars, or from six months' to one year's imprisonment, or both, at the option of the court.

Section four provides for the appointment of a State dairy commissioner, with a salary of two thousand five hundred dollars, and an appropriation of two thousand five hundred dollars for the expense of enforcing the act.

Section five authorizes the commissioner thus appointed by the Governor to employ chemists and experts to examine all packages, cans, &c., from which dairy products of any kind are sold, and also power to enter all factories, barns, &c., in which he suspects illicit manufacture is going on.

Section six gives the courts of quarter sessions power over all cases tried under the provisions of the act.

Section seven makes the possession or offering to sell imitation or adulterated dairy products presumptive evidence of a knowledge of their unlawful nature.

The committee, fearing that the commissioner under this act (being *de-facto* an inspector) would be in conflict with the Constitution, offered the following for substitutes for sections four and five: Substitute section four provides that in all cities and municipalities the mayor or proper officer shall appoint a public analyst, whose duties are similar to those of the commissioner provided for in the original act, and gives him the power to take samples at any and all times, and in any place; all samples to be divided between the analyst and the party offering the goods for sale.

They also presented a substitute for sections four and five, which made it the duty of policemen and constables to report quarterly all violations of the law in their respective districts to the courts of quarter sessions, and made it the duties of all district attorneys to prosecute. Substitute section five gives the district attorneys full power to examine all cans and packages for violations of the provisions of the act.

ACT NO. 2.—A RESTRICTIVE ACT.

Section one provides that all packages of imitation butter or cheese shall be plainly and distinctly stamped as such, and shall, by the label, state the percentage of the ingredients which they contain.

Section two compels every manufacturer of imitation butter to file annually with the Secretary of the Commonwealth a statement showing the amount of said imitation article sold during the preceding year. It further provides that all manufacturers shall pay a license fee of ten dollars for every hundred pounds made or sold, and that they shall file in the office of the Board of Agriculture the analysis required by the first section of the act.

Section three provides a penalty of from fifty to one hundred dollars for each offense, and gives one half to the informer.

Section four makes it the duty of the Board of Agriculture to test samples of butter which may be sent to it in accordance with the law, and to report the result, all expenses of such work to be paid out of a fund composed of the license fees paid in accordance with section two.

Section five constitutes the license fee fund a special one for the purpose of enforcing the law, and prohibits the expenditure of an amount greater than that paid in by the manufacturers.

Section six defines the meaning of the term "imitation butter and cheese."

Section seven repeals all acts, or parts of acts, which are inconsistent with the act of which it is a portion.

NO. 3.—A LICENSING ACT WITH RESTRICTIVE CLAUSE.

Section one provides that every manufacturer of imitation butter or cheese shall take out a license, and shall pay a license fee of fifty dollars per thousand pounds manufactured and at the same rate for fractions of this amount.

Section two compels every retailer to pay a license fee of one hundred dollers per thousand pounds on all sales.

Section three makes it the duty of manufacturers and retailers to file with the Secretary of the Commonwealth a certificate showing the exact amount sold or manufactured for sale.

Section four makes the act take effect from and after its passage.

Edward Brinton, Esq., of West Chester, presented the following draft of

AN ACT

For the protection of the public health, and to prevent adulteration of dairy products and fraud in the sale thereof.

SECTION 1. *Be it enacted, &c.*, No person, company, firm, or corporate body shall manufacture out of any oleaginous substance, or any compound of the same, other than that produced from unadulterated milk, or of cream from the same, any article designed to take the place of butter or cheese produced from pure, unadulterated milk or cream from the same, or any imitation or adulteration of butter or cheese, nor shall sell, or offer for sale, or have in his, her, or their possession, with intent to sell the same as an article of food.

SECTION 2. Every sale of such article or substance, which is prohibited by the first section of this act, made after this act shall take effect, is hereby declared to be unlawful and void, and no action shall be maintained in any of the courts of this State to recover upon any contract for the sale of any such article or substance.

SECTION 3. Every person, company, firm, or corporate body who shall manufacture, sell, or offer, or expose for sale, or have in his, her, or their possession, with intent to sell, any article or substance, the manufacture or sale of which is prohibited by the first section of this act, shall, for every such offense, forfeit and pay the sum of one hundred dollars, which shall be recoverable with costs by any person suing in the name of the Commonwealth, as debts of like amount are by law recoverable, one half of which sum, when so recovered, shall be paid to the proper county treasurer for the use of the county in which such suit is brought, and the other half to the person or persons at whose instance such suit shall or may be commenced and prosecuted to recovery.

SECTION 4. Every person who violates the provisions of the first section of this act shall be guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than one hundred dollars, nor more than three hundred dollars, or by imprisonment in the county jail for not less than ten or more than thirty days, or by both such fine and imprisonment for the first offense, and by imprisonment for one year for every subsequent offense; one half the fine imposed to be paid to the prosecutor, and the other half to the treasurer of the county in which the conviction is had.

SECTION 5. This act shall take effect on the —— day of —— ——, A. D. one thousand eight hundred and eighty-five.

SECTION 6. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

The Secretary of the Board presented the following synopsis of the laws of New York, Maryland, Missouri, and Vermont:

New York.

Section first provides that any person selling unclean, impure, unhealthy, adulterated, or unwholesome milk, or articles of food made from such milk, shall be punished by a fine of from twenty-five to two hundred dollars, or six months' imprisonment, or both, at the option of the court.

Section second provides that no person shall keep cows in crowded or unhealthly stables, feed unhealthy food, or manufacture any article of food from such milk, under a penalty equal to that of section first.

Section third provides that no person shall bring to any butter or cheese factory any milk diluted with water, adulterated, unclean, impure, or unwholesome milk, or from which the cream has been removed, (except for skim-milk cheese,) or who shall keep back any strippings, or who shall supply sour milk, or any butter or cheese factory which shall use such milk shall be punished by the same amount of fine and imprisonment.

Section fourth provides that no manufacturer of butter in packages shall sell it in unstamped vessels, and that the stamp must be of legible letters at least one fourth of an inch long; penalty for a violation, from fifty to one hundred dollars' fine, or two to four months' imprisonment, or both.

Section fifth provides that no person shall sell (except in the county in which it is produced) any milk except in cans, vessels, or packages "durably and distinctly marked and branded with letters not less than one inch in length, and above the center of every can, vessel, or package containing such milk, the name of the county from which the same is produced." It also provides that the same marks shall be on the vehicle from which it is sold. The penalty for a violation is a fine from twenty-five to two hundred dollars, and imprisonment of from two to four months, or both.

Section sixth provides that no person shall manufacture "any oleaginous substance or substances or compounds of the same, other than produced from milk or cream from the same, any article designed to take the place of butter or cheese produced from pure, unadulterated milk or cream from the same, or shall sell, or offer for sale, the same as an article of food." This section makes an exception in favor of skim-milk cheese, and imposes a penalty of from one hundred dollars to five hundred dollars, or one year's imprisonment, or both, for any violation.

Section seventh provides that any one selling butter or cheese falsely labeled shall be subject to a fine of from twenty-five dollars to fifty dollars, with imprisonment for a second offense.

Section eighth provides that all condensed milk shall be made from pure milk only and be plainly labeled and in air-tight packages; any violation to be punished by a fine of from fifty dollars to five hundred dollars and imprisonment of six months, or both.

Section ninth authorizes the Governor to appoint a dairy commissioner, with a salary of three thousand dollars per annum, whose duty it shall be to enforce the provisions of the act. This section also appropriates the sum of thirty thousand dollars for the expenses of the commissioner.

Section tenth gives the commissioner free access to all buildings, cans, &c., and power to compel the opening of any package, can, or parcel, for the purpose of investigation.

Section eleventh gives certain courts jurisdiction over all cases arising under the law.

Section twelfth applies all fines to assist in the payment of costs, all deficiencies therein to be paid by the State.

Section thirteenth provides that all milk showing more than eighty-eight per cent. of water or less than three per cent. of fat, or from a cow within fifteen days of calving, or five days after calving, or cows fed on distillery slops, or any substance in the state of putrefaction or fermentation, shall be deemed as unclean and form improper food, provided that the section shall not prevent the feeding of ensilage.

Section fourteenth provides: "That the doing of anything prohibited being done, and the not doing of anything directed to be done by this act, shall be presumptive evidence of a willful intent to violate the different sections and provisions hereof."

Section fifteenth repeals certain acts and parts of acts conflicting with the law, and section sixteenth provides that the act shall go into effect on the first day of June, 1884.

Maryland.

Section first provides that every person who offers or exposes any substance in the semblance of butter or cheese which is not wholly made from milk or cream shall brand each package with the word "oleomargarine" in letters not less than half an inch long, and that each retailer shall give to the purchaser of each package or parcel a printed card or label bearing the same word and in letters of the same size.

Section second, that any one offering or selling imitation butter or cheese not properly branded or stamped, or without delivering the proper label, shall be punished by a fine of one hundred dollars, one half of which shall be for the use of the informer.

Section third provides an additional penalty in the form of an imprisonment of from ten to ninety days.

Section fourth authorizes the confiscation of goods sold in violation of the provisions of the act.

Section fifth authorizes the city of Baltimore to enforce the act by proper ordinances.

Missouri.

The act of this State (which has been pronounced constitutional) is essentially section sixth of the New York law.

Vermont.

Section first provides that all packages in which imitation butter is packed, or from which it is sold, shall be stamped with the word "oleomargarine" in letters not less than half an inch long, and that every retailer of this class of goods shall deliver to the purchaser a written or printed label bearing the word "oleomargarine," with every package or parcel.

Section second imposes a penalty, for the violation of either of these provisions, of twenty dollars, and that proof of sale shall constitute presumptive evidence of guilt.

Section third makes the act effective from and after its passage.

Two acts have been introduced into the Legislature of Vermont, one of which, by Mr. Parker, provides, by section first, that every manufacturer of "oleomargarine and other substitutes for butter" shall make monthly return, under oath, of the number of pounds manufactured, and if the amount returned varies ten per cent. or more from the exact amount made, the manufacturer is subjected to a fine of five hundred dollars. Section second provides that every manufacturer shall pay a royalty or fine of fifteen cents per pound upon every pound manufactured; if this amount is not paid on or before the fifteenth day of the succeeding month, power is given to collect as other defaulting taxes are collected. Section third provides that every manufacturer shall take out an annual license, for which he shall pay the sum of ten thousand dollars, and that every retailer shall take out a similar annual license, for which he shall pay a license fee of two thousand dollars, and that any one selling without license shall be fined five hundred dollars.

A second act, introduced by Mr. Child, provides for a revision of the act now in force (as first named in this article) by the insertion of the words "one half of the fine to be paid to the informer."

Mr. Edward Brinton, of West Chester, Pa., then read the following essay on

THE OLEOMARGARINE LAW, AND REASONS FOR ITS PASSAGE.

If adulteration and deception in human food material is comparatively an old abuse, there is something about its latter manifestations which is not old. Formerly, those who practiced these tricks confessed their immorality by concealing and denying them, but now the adulteration of butter not only plants itself among the legitimate industries, but defends and justifies itself when attacked, and even assumes an air of injured innocence. The makers of bogus butter have exhibited a lack of moral deception in which they will be swiftly followed by other adulterators. Under the shadow of the law, they manufacture an article of food which they know the consumer will not knowingly eat. The question for them to solve is: "How can we make the consumer eat our adulterated stuff?" The question for the consumer is: "How are we to know the real from the bogus?" And the question for the farmer is: "How are we to be protected in the sale of our genuine goods?" There is, perhaps, at present no subject that, of necessity, forces itself upon the attention of all classes of society more forcibly than that of imitation butter, as butter has become one of our most staple articles of food, and the people of this State are watching with keen interest what is being done in the matter. This Commonwealth is not slow to see the impending danger to its great dairy interests by the introduction and indiscriminate sale of bogus butter. Restricting laws have been passed, their object being to require these imitation goods to be sold for what they are. There is now in force upon our statute books, affirmed by His Excellency Robert E. Pattison on the 24th of May, 1883, a law that would seem as though it ought to fulfill every requirement. It states that every package of imitation butter or cheese sold shall be plainly marked as such. It goes further, and states that in case of retail sales of such articles, the seller shall in all cases deliver to the purchaser with each package a printed label bearing plainly the words, "oleomargarine butter," or of cheese, the words, "imitation cheese." In case this law is violated, a fine or imprisonment, or both, are to be prescribed. If the provisions of this law could or would be enforced, you would not discover that at present the farmers and dairymen of Pennsylvania are rising almost to a man and demanding protection from our Legislature. The present law exists only as a mockery to our law breakers and makers, for it is well known that there are sold weekly in our State hundreds of thousands of pounds of milk and tallow, of lard and butter, of oil and acids, called genuine butter, sold for genuine butter, and the price of genuine butter charged for it, while the victimized consumer has no opportunity to discover the fraud practiced upon him, and the producer of real butter is forced to come in direct competition with this cheap bogus stuff. It is very doubtful if it is generally known to what enormous proportions the sale of "oleo" and "suine" has reached. It is sold openly and above board in every hamlet, borough, and city of this State, and at least ninety-nine per cent. is sold for genuine butter. Careful investigation has shown that nearly half the butter consumed in all our large cities is adulterated. Its manufacture has been so perfected that chemical analysis is often necessary to determine the real from the bogus; especially is this the case with suine. That the great deception of imitation dairy products has depressed the markets and materially lessens the income of the dairy farmer, is too self-evident to require argument. It is sufficient to call your attention to the fact that each mid-winter finds our butter markets dull and overstocked, with declining prices, which is the reverse of past years. The prices paid farmers at the creameries for their milk has been declining at the rate of half a cent per quart each year, for the last two years. The oleo manufacturers are sharp and unscrupulous; they work together with one sole object: to accumulate money by sharp practices and at the expense of the hard-working farmer. Restricting laws to protect the producer and consumer of butter against fraud and deception have been passed in a number of States; so far, they have utterly failed in every case. I state, with entire confidence in its correctness, that there is not a member of this Board, nor of the Legislature of this State, but will admit that something should be done at once to remedy this evil. If the most stringent restricting laws that learned legislators and constitutional lawyers could devise have proved utterly ineffective, then there is but one course to pursue: *prohibit*, by legislation, the manufacture and sale of imitation butter and cheese within the State. With this object at heart, I have forwarded to Mr. Eastburn Reeder, the chairman of your Committee on Dairy Products, the draft of a proposed law which I hope he will see fit to bring to your notice in his report. It differs but little from the New York law, except that it does not require the appointment of a commissioner to enforce its provisions, as it seems that would not be constitutional in Pennsylvania.

It merely provides that it shall be enforced by the well-known civil and criminal proceedings before justices and aldermen and in our county courts. Perhaps some more effective way can be devised, but it would be well to bear in mind that there are in this State a number of well organized and strong associations of farmers, dairymen, creamerymen, and butter dealers, all anxious to see bogus butter eradicated root and branch. Adopt a prohibitory law, and there is little doubt that ample ways and means can be found to enforce it. Missouri has a prohibitory law, without any special officers for its enforcement. It has been decided constitutional, and they are enforcing it with a vim. I clipped the following extract from the *Missouri Republican* of January 15, 1885: "The original law, as passed by the Missouri Legislature, is as follows: 'Section 1. Whoever manufactures out of any oleaginous substance or compound of the same, other than that produced from unadulterated milk or cream from the same, any article designed to take the place of butter and cheese produced from pure, unadulterated milk or cream from the same, or shall sell, or offer for sale, the same as an article of food, shall, on conviction thereof, be fined not exceeding one thousand dollars, or confined in the county jail not exceeding one year, or both.'"

This law has been tested in numerous instances, and has been passed upon by the Supreme Court of the State of Missouri, and by the United States circuit court of Kansas City.

In the case of the State of Missouri *vs.* Fairbanks, conviction was secured before Judge Cady, of the court of criminal correction. The decision was sustained by the court of appeals and by the Supreme Court of the State. It was then taken to the United States Supreme Court. In the meantime, however, Justice Miller, of the United States Supreme Court, sitting in Kansas City as circuit judge, sustained the constitutionality of the act, and dismissed the appellant's bill. It was claimed that the bill was illegal because it infringed upon personal liberty. The Court, however, ruled that the Legislature had police power to protect the public health.

The New York prohibitory law has been decided constitutional in that State. McGann, an oleo manufacturer, was arrested and convicted. He carried the case to the Supreme Court, but it sustained the decision of the lower court, maintaining that the law was constitutional. It was said he would carry the case to the court of appeals, his last resort, but it now appears that he has a large oleo manufactory ready to open in Pennsylvania, and will remove his entire business here, if this State will accommodate him by not passing a prohibitory law. There is a moral here that each and all can understand. The sale of oleo and butterine has not entirely ceased in New York, but Commissioner Brown, in his recent address before the New York State Dairymen's Association, plainly showed that the traffic in it had fallen off at least ninety per cent. since the law came into effect. The association adopted a resolution declaring itself satisfied with the workings of the law, and they did not wish it changed.

Commissioner Brown, in his first annual address to the Legislature, delivered on the fifteenth of this month, said: "There have been, during the year, sixty arrests for dealing in the elicit stuff. Of these, eleven convictions have been secured, forty of the defendents are under indictment, or have chosen to be tried by special sessions, ten cases are still pending in police courts, and four have been discharged." If a prohibitory law is found to be working satisfactorily in New York, why should Pennsylvania hesitate to protect herself, and thereby render the law more effective in both States? It is said, if it could be shown that "oleo," "suine," &c., were detrimental to the public health, their sale would be at once stopped. While we admit that chemical analysis has shown them to be composed of harmless ingredients, if those ingredients are pure, we maintain they are very dangerous compounds for at least two decided reasons. In the first place, the lard used in "suine"—and about nine tenths of the bogus butter is suine—is cold pressed; that is, the fat as taken from the hog is not heated over a temperature of one hundred degrees, when the lard is pressed from it; in that condition it goes into the human stomach, and, should it contain the fatal *trichinæ*, there has been no heat sufficient to destroy them. That of itself should be sufficient to condemn the whole imitation stuff.

In the second place, it is well known that most bogus butter is composed of about forty per cent. butter and sixty per cent. of oleo, oil, or lard. Now, if they use the finest and purest of these ingredients, they would cost, at present market prices, at least sixteen and fourteen cents respectively, making the material cost thirty cents per pound without reference to the cost of manufacture, &c. Yet we find the best grades of oleo, suine, &c., sold by the wholesale dealer at not above fourteen cents per pound, after the manufacturer has had a big profit. What does this mean? Simply this: the manufacturer uses nothing but inferior low-priced butter, and the poorest quality of fat—gut fat, if you will excuse the expression. The substance is deoderized with acids, colored and flavored until an apparently respectable compound is produced. Is it not easy to see the great danger that arises from using this cheap unsalable fat? Will it not often come from unhealthy and condemned animals? And if such compounds are still to be in the market, forcing, by competition, genuine butter nearer their own price, will they not, in order to maintain their hold, have to be made still cheaper? Is there not another danger threatening the dairy interests by allowing the sale of bogus butter to continue? It is generally admitted that consumers will not use it if they know it, and if they think they are likely to be deceived and cannot afford to buy butter that is unquestionably pure, they will do without, and thus the consumption of butter will materially fall off. The argument is used that to prohibit the sale of an article of food infringes on the rights of the people; but what class of people will feel their rights trampled upon? Certainly not the farmers, surely not the wholesale or retail butter dealers, for they are anxious to a man to have all kinds of adulterated products out of the market, and it is universally known that the butter consumers of Pennsylvania do not want it at any price, and then such a law would only interfere with a few manufacturers who make their business profitable by fraud and deception There are other restricting or regulating laws which have their advocates, which will receive the consideration of this Board; but it is a question if they will be effective, when they allow the manufacturer of a substance which can only be sold for what it is not. Is it not a very significant fact that Dr. Leffman states, in giving the results of his analysis of thirteen samples of butter, that he found six suspicious—that is, he was not certain what they were?

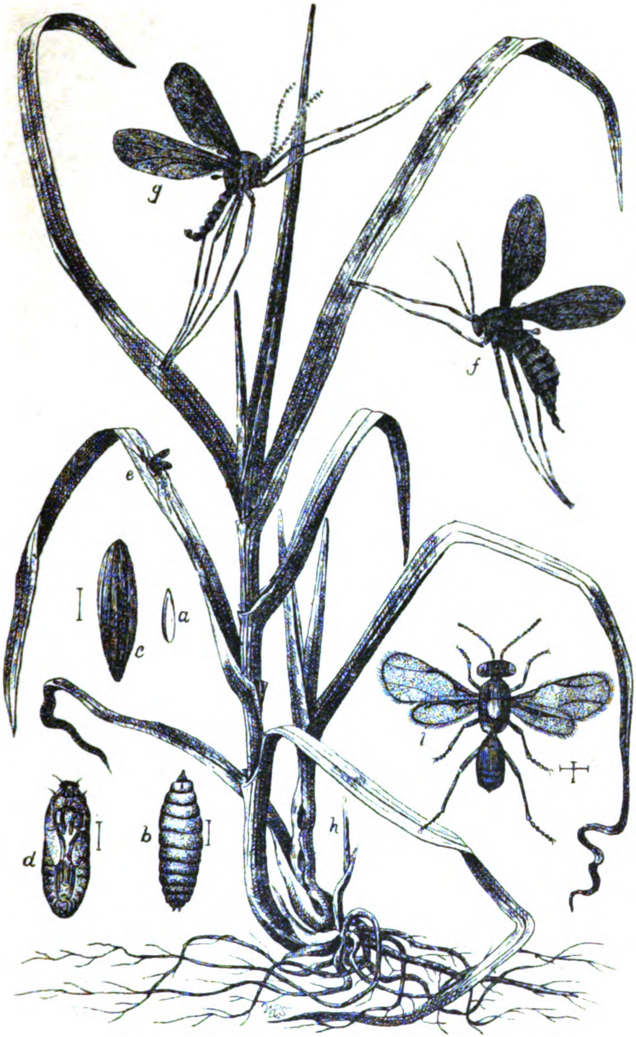
If scientific chemical analysis is not positive proof of adulteration, how is any restricting law to be enforced? The only way the evil will be remedied is to stop its traffic at the fountain-head. I quote from a letter on the subject, received from Assistant Dairy Commissioner VanValkenburgh, of New York: "After six months' experience in enforcing the prohibitory law, I am very positive in my opinion that prohibition is the only remedy for the evil. For, if it is allowed to be sold at all, it will be sold for butter, for the simple reason that the consumer will not knowingly buy it as an article of food." Gentlemen, the citizens of Pennsylvania look to you to draft and advocate the passage of a bill to remedy this great evil of adulterated dairy products, and the deception in the sale thereof. In doing so, you will, of course, bear in mind the enormous amount of bogus butter sold; the outrageous deception practiced in its traffic; the utter uselessness of our present law, and the rights of the people in the matter; the great depression there is in all farming products, the enormous value of the dairy interests of Pennsylvania; that this country has resources to produce enough genuine butter and to spare; that the masses of the people do not want adulterated butter at any price; that the Legislature has police power to protect the public health, and you will also, I believe, consider carefully the past experience of this and our sister States in regulating the sale of adulterated dairy products.

Mr. Reeder, chairman of the Committee on Dairy Products, then continued his report, as follows:

"The remaining part of the report relates to the milk standard, and, as it was decided yesterday to separate the two questions, this committee has nothing further to report at this time, except to say that it has had submitted to it by Mr. Edward Brinton, of Chester county, several different acts relating to the regulatory law, the licensing law, and also another prohibitory law, which acts can be read if it is thought necessary. The prohibitory law has substitute sections in it. The original bill provides for the appropriation by the Legislature of twenty-five thousand dollars. It was thought that that would be about in proportion to the appropriation of thirty thousand dollars by the Legislature of New York, as the dairy interest is larger there than here, and, also, the appointment of a committee to execute the law; but before we could do that we would have to have an amendment to the Constitution. Therefore, in lieu of that, there are two substitute sections prepared—one making it the duty of policemen in cities, and constables in townships, to execute the law, who are to make the examinations in their respective districts, and report violations of the law to their higher respective authorities, and finally to go up and be prosecuted by the district attorneys. The other plan is to adopt the features of the milk bill, and have the mayors in cities, and the commissioners or judges of courts in counties, appoint inspectors. We thought that the first thing that was proper was for the Board to decide upon what kind of a law it would recommend. We have brought up with us from Philadelphia two samples of butter, which we now produce for the inspection of the members. I have only this explanation to make about this butter: I thought, as we were going to discuss the oleomargarine question this morning, that it would be best to have some of it here that was known to be such. This sample, contained in a ten-pound tub, is sold to the wholesalers by the manufacturers at thirteen cents a pound, and they retail it at fourteen and a half cents. This is the lowest grade, and was made in New York. I do not know the name of the manufacturers. I was satisfied to know where it was made. The other sample was made in Philadelphia. The wholesale price of it is twenty-one cents a pound, and it is retailed at twenty-four cents. There is not a particle of butter in either sample."

Mr. SATTERTHWAIT, of Montgomery. On behalf of the association of farmers of Philadelphia and adjoining counties, who have sent me here with a large delegation, I think it would be proper for me to say a few words. We have no other voice in this assembly but the privilege that is accorded us to express our opinion. We have been instructed by our association to advocate the passage of a prohibitory law. We have considered all the objections that have been urged against such a law, and we have deliberately come to the conclusion that it is the only way to meet this case. There is not much for us to say at this time. The ground has been so well gone over that it has left little or nothing for us to say except to tell you that the farmers and the people of that section are unanimously in favor of a prohibitory law. We have considered the constitutional objection that has been raised, and we have come to that conclusion. There are just a few points that have occurred to me during the reading of the very able essay that we have just listened to which I might mention. I notice that the Secretary of the Board, in his report, lays great stress on the argument that the low price of butter at this time is from over-production, and that a prohibitory law, even if it could be carried into effect, would not be available for bettering the condition of the dairy interests. But I think that that is an error when we consider the immense amount that is used. It is safe to say that one half of that which is now used as butter is not butter. If the stuff was out of the market, does it look reasonable that there would be this depreciation in the price of butter? Now, there is one other point. I have had very good opportunities, attending the Philadelphia markets as

I do, of knowing something about the kind of material that is being used, and I think it very important that the public should be enlightened on this point. I do not think that we ought to place the grounds of our opposition to this stuff entirely on the ground of injury to the dairy interests; I think we ought to be able to meet it on other grounds; I do not think we ought to take that ground alone, because people would very naturally say, "If you cannot compete with this article, if they can make a cheaper article and there is nothing harmful in it, there is no good reason why we should not have the benefit." But if the people knew the material which is used in the making of it, they certainly would be unanimous in their desire to have it suppressed. Now, I happen to know the kind of stuff that is used in its manufacture; at least I have the very best evidence to believe I know. I noticed a man gathering up fat, and I observed that he was very dirty about it; he stamped it into his basket with his dirty feet, covered with filthy black mud. I said to him, "That stuff you are collecting is not fit to make butter." He said, "It doesn't make any difference how dirty it is, the people at the factory don't care—horse fat or anything else, it is all the same to them." I have every reason to believe that this man went to the place where they manufacture up dead horses—not only horses, but any other dead animals that they gathered up in the streets, such as dead dogs, and got the fat and supplied the establishment with it. I suppose the fellow, if interrogated about it, would deny it, because it would be against his interests to admit it; but I have the very best reason to believe, from what he told me, that he did this. Now, it may be that even a chemist might not be able to detect this stuff after it has gone through a process with nitric acid, or whatever they use—even a chemist might not be able to detect anything unwholesome or deleterious in it after it has gone through the process it is subjected to. But I do not believe that such stuff as that can be wholesome food for human beings. Now, if this be so, where is the objection to making a law prohibiting its manufacture? I am a plain farmer, I am not a lawyer, and I presume it would be presumptious for me to give an opinion, but I have searched through the Constitution, and I am sure there is nothing, and there never was intended to be anything, in the Constitution to prohibit the people of this Commonwealth from protecting themselves against such a thing as this. The objection has been raised, and that is the great point, of the difficulty of carrying out the provisions of such a law. They say that in many cases pure butter is imitated by putting such a large quantity of butter into the article that it is almost impossible for even a chemist to detect the difference. I do not think there would be any difficulty in the matter if we had the right kind of a law with a sufficient penalty attached for its enforcement. We would begin in this way: The article is always manufactured on a large scale; it cannot be conducted profitably any other way, and there would be no difficulty in reaching the large establishments where it is made openly; they could not conceal it; there would be no trouble in reaching them and convicting them. That would be one great step. Then we would begin with the fourteen cent stuff; there is no butter in it, and there would be no trouble in detecting it and reaching the offenders—the evidence would be sufficient to satisfy a jury, I think, as to that material. Beginning that way by making the penalty sufficiently great, I do not think there would be any difficulty in enforcing such a law. I will not take up the time of the Board in longer discussion of this question. I thought it was right that I should say as much as I have just to let the Board know what is the feeling of our people on this subject, and that we are all in favor of a prohibitory law.



THE HESSIAN FLY.

(Copied from the report of Prof. Riley.)

A healthy stalk of wheat on the left; the one on the right dwarfed and the lower leaves beginning to wither and turn yellow; the stem swollen at three places near the ground where the "flax seed" (*h*) are situated, between the stem and sheathing base of the leaf. *a*, egg of the Hessian fly (greatly magnified), as are all the figures except *e* and *h*. *b*, larva, enlarged, the line by the side, in this and other figures, showing the natural length. *c*, the "flax seed," pupariam or pupa case. *d*, the pupa or chrysalis. *e*, the Hessian fly natural size, laying its eggs in the creases of the leaf. *f*, female Hessian fly, much enlarged. *g*, male Hessian fly, much enlarged. *h*, "flax seed" between the leaves and stalk. *i*, Chalcid or ichneumon parasite of the Hessian fly, male, enlarged.

Mr. CARTER of Chester. I occupy almost the same position as the gentleman from Montgomery (Mr. Satterthwait) who has just spoken. I represent an association of creamery men in Chester and Lancaster counties; they appointed, at a late meeting, a committee to represent their views before this organization; they appear here without credentials, of course, but, at the same time, they send some resolutions here for your consideration which are favorable to a prohibitory law, and ask for your assistance in procuring the passage of such a law. [See resolutions as embodied in the minutes of the meeting.]

Mr. BEEBE of Venango. In offering the resolution which I did in relation to this matter, it was with a view to expedite business in the first place, in order that the association might determine whether it was in favor of restrictive or prohibitory legislation. I embodied in the language of that resolution my idea why prohibitory legislation should be enacted. The words used are, "To prevent deception in the manufacture and sale of dairy products, and for the preservation of the public health." That which is made and sold as a fraud, in order to make a market for it, is, beyond doubt, a subject for appropriate legislation. If it be true, as I have been informed by those who profess to know, that this material is manufactured out of vast masses of a kind of stuff which we would revolt to know we were eating, and which is deleterious to public health, I apprehend that there can be no doubt but some necessary legislation ought to be enacted. I should not like to repeat here the statements that were made to me while going to the West as to the materials and the methods—the criminal methods—that go to make up the manufacture of the oleomargarine that is put upon the market and sold. That the Legislature of the State of Pennsylvania has the power to enact, and that we have the right to ask that it will prevent deception in the manufacture of imitative products so vastly useful as dairy products, by the passage of a suitable law, and that it will protect the public health, cannot be questioned. Taking this view of it, I have offered this resolution from that stand point, believing it not only right, but strictly legal. As one of the Constitution-makers of Pennsylvania, as a humble representative of that convention, I was not aware that we were disenabling (if I may be allowed to use the term) the people of Pennsylvania from preserving the public health. I still think that the public sentiment of Pennsylvania, expressed in legislative enactment, can easily devise some method for the protection of the people from the deleterious effects of the manufacture and sale of this article. I do not think that the State Board of Agriculture need necessarily perfect an act, from a legal standpoint, that the Legislature shall take and pass. Our legislators are not of that class. They would feel it an encroachment upon their special prerogative if this Board were to proceed and frame an act and ask for its passage as framed. In offering this resolution as expressive of the sense of the Board, the parties interested can, through their representatives, offer such legislation as they may deem best. I would not like to be dictatorial and say to the Legislature that our wisdom had devised legally and judicially that act which they are now called upon to pass. So that if we determine our sense in the matter, if we make known our position, it is not necessary to waste our time in details as to the matter of legislation.

Mr. PIOLLET of Bradford. There is a thought which I wish to throw out for the consideration of that class of people who rather condone this offense against the public health and morality of the State by showing the great risk to which they make themselves liable in permitting this constant effort to produce something that has the similitude of butter. Now, I trust that when you come to my part of the country, I shall be able to take you to a dairy, not an expensive one, but a cleanly one. The whole study and effort of the farmers of my county have been to make pure butter out of pure milk, to have their dairy cows have pure water and pure grass. The excellence of our butter—for Bradford county butter is known—comes from that. Now, there would not be any difficulty in adding twenty per cent. of suine to my butter, and it is not likely that it would be detected. But we run the risk of forcing the farmers of this State into a general system of adulteration in order to compete with this stuff that is put upon the market. That is a question for the consideration of gentlemen who rather condone this thing than otherwise. The idea of eating such stuff as has been produced here [alluding to samples of oleomargarine on table] is as offensive and as loathing as anything could well be. The idea of taking lard from the hog, of tallow from the paunch of a steer, or of melting up an old cow and making a lot of grease, and then deodorizing and fixing it up, and forcing it upon the public, that sort of deception is horrible. It is an offense against the public morality as well as against the health of the State, and ought to be prohibited. I am delighted to see such a unanimous expression of opinion against it, for I supposed that the manufacturers were going to bring in their representatives and I was fixing to give them a welcome. [Laughter.] I repeat that I wish to invite the attention of the mass of our people, and of those who are careless in their ideas and are rather disposed to condone this matter, that they run the risk of a wholesale adulteration of one of the most valuable articles of human food. We do not produce much more butter than is required for the consumption of our own people. The export is only about four per cent. of the product, and the natural disposition of our dairy people to deal in the manufacture of a pure and cleanly article must not be interfered with by adulteration, which will compel them, in order to save themselves, to go into that wholesale adulteration. The gentleman who buys butter in Chester county and gives eighty cents a pound for it may think he is all right, but he is not safe. I am glad to see that we are going to have a unanimous vote recommending to the Legislature the passage of a prohibitory law. I attended the last meeting of the New York Dairymen's Association. Mr. Brown (the New York State Commissioner) was there, by invitation, and gave, in detail, a statement of the efforts he had been making. His judgment, as expressed, was that nothing short of a prohibitory law would protect the public against this bogus stuff. The farmers give enough towards the support of the Government of Pennsylvania to entitle them to the right of asking the legislation which shall protect them. Why, you protect the banker against the counterfeiting of his bills, you protect the manufacturer in his trade-mark by processes that are effective. Now, paying as we do, seventy-five per cent. of the cost for the administration of justice, and all the machinery of this Government of ours, why shall we not ask to be protected against counterfeiters? The Government of the United States doesn't allow the making of counterfeit money. It annihilates everything that is used for that purpose, and I think our police power in this State ought to be brought into full force and effect to destroy any attempt to injure the many deserving people who are engaged in the making of butter and cheese, and in producing milk for the many beneficent purposes to which it is put.

Mr. MUSSELMAN of Somerset. I can say, like the gentleman across the way, that I represent a county (Somerset) that don't amount to much.

Yet, we make the celebrated Glade butter. I am a farmer, and came here for the purpose of taking a conservative stand upon this question. My idea was that, perhaps, we had best have the article sell upon its merits —that it be labeled as such, and no more. But, since the preponderance of opinion—the unanimous opinion—of the Board is the other way, I think the best thing we can do—for I do not want to be captious—is to pass this resolution.

Mr. FORESMAN of Lycoming. The whole sense of this meeting, as I understand it, is that we want a prohibitory law in regard to the manufacture of this stuff, as it is called, and I think, if the same testimony is given before the Legislative committee that has been given here, there will be no question but the Legislature of this State will take notice of it. The only question that seems to arise is the Constitutional question. Let that be decided by the Legislature. We are not here for the purpose of passing the law itself. We are here for the purpose of saying to the Legislature of this State that we recommend that the manufacture of this stuff, after what we have heard here, be abolished. I do not see any need of our attempting to prepare a bill here. Let the persons who are interested in this matter, more particularly the people near Philadelphia, prepare a bill and use such efforts for its passage as they desire, and that the members of this Board be requested to use their influence with members of the Legislature to support such a bill as those who are most interested in it desire, and to see that it passed.

T. J. EDGE, (Secretary of the Board.) Mr. President, it has seemed to me that during much of the discussion now taking place with reference to the merits and demerits of prohibitory legislation as it relates to the manufacture and sale of imitation butter and cheese, a strong point in the affirmative has been almost entirely neglected. We have been told of the effect which these goods have had upon the price of legitimate dairy products; that they have materially injured the business of dairying; that butter is now ten to fifteen cents per pound lower than it would have been if imitation goods had not been introduced; that if not prevented, this manufacture will sooner or later inflict still greater injury; in fact, that to use the words of one of the New York Senate committee, "the living cow cannot compete with the dead hog." These all may be, and no doubt are, facts, but they do not furnish a legitimate argument against the manufacture and sale of these goods. If they only interfere with the profits of the dairy and with the sale of dairy butter, they furnish no good reason why the business should be prohibited. We must base our arguments upon wider and stronger grounds; we must show that it is injurious to public health; that it contains elements which should not go into a common article of food; that however palatable it may be, its effect upon the health of the consumer is such as should prevent its manufacture. It is proven, and admitted by the manufacturers, that cotton-seed oil, sesame oil, and lard oil are used. It is admitted that the oil is extracted from the lard under pressure and at a temperature of not more than one hundred and twenty-five degrees. It is proven that this temperature will not kill the germs of *trichinosis*, tapeworm, and other parasites which are found in the flesh and fat of the hog. It is well known to the medical fraternity that, to certain persons and under certain conditions, cotton-seed oil is dangerous and injurious if used with food; that in no case is the fatty oil heated to a temperature which will kill parasite life which it may have contained, and it is for these and other reasons that its manufacture should be prohibited.

As an additional reason to those which I have urged, we may fairly claim that as at present its sale is a fraud upon the public, who, in most cases, purchase it at retail as butter, and that its price increases as it more closely resembles the more legitimate dairy product; that it is not sold for what it is, but rather for what it is not, viz: butter; that if sold only on its own merits its manufacture would be curtailed fully seventy-five per cent.; that in many cases it contains a certain varying percentage of genuine butter, and that in these cases it is impossible even for a chemist to say whether the article contains injurious products or not. Our claim, then, should be that it is a fraud on the public who purchase, under the name of butter, an article which, under its true name and merit, they would not touch; that under the name and credit of butter, they are furnished with an article made, at least partially, from products which are known to be injurious to health and dangerous as food. Urged upon these grounds, we have a strong claim, but upon the claim of injury to any trade or business we are weak, and unnecessarily weaken our cause. If we fail to prove that the article is injurious to health, and fail to made out such a case, we must then fall back to the claim that it should be sold for what it really is, and not upon the credit of a well-known and universally-used commodity.

Mr. REEDER. Mr. President, bill No. 1 is a copy of the New York State law. The first and second sections relate to milk and skim-milk, which were stricken out yesterday. The third section is the sixth section of the New York bill, which is also a word-for-word copy of the Missouri law. The fourth, fifth, sixth, and seventh sections are the concluding sections of the New York law, providing for a State appropriation of twenty-five thousand dollars, instead of thirty thousand dollars, for the appointment of a dairy commissioner, and all that. We knew we could not get that without having an amendment to the Constitution. Then we have prepared two substitutes—one of them, in accordance with the idea advanced to us by His Excellency the Governor of the State, making it the duty of policemen and constables to execute the law. I think it would be proper to read those substitute sections. Then, since we have received the copy of this milk bill from the Social Science Association, all the sections, from section eight to the end of the bill, make it the duty of each city and county in the State to appoint city and county inspectors. Now, in place of all that, another substitute can be put in in that form; instead of making it the duty of policemen and constables, let us have city and county inspectors, with their mode of operations, and their fees, as provided for in these sections of the milk bill. Let us have that incorporated in our prohibitory milk bill, if that is considered better than this other plan of having policemen and constables do it.

The other prohibitory bill is the one drafted by Mr. Brinton, which I will read. You will observe that this bill does not make any special provision for its enforcement. It leaves it free for anybody to prosecute under the act; and that, I take it, is the point to be settled by this Board, whether they will have a general act, which we can proceed to prosecute under the general laws of the State, or whether we will have special methods of enforcing the law pointed out in our bill.

Mr. FULLER, (President Pennsylvania Dairymen's Association.) Mr. President, and gentlemen of the Board: I propose to refer very briefly to the legislation which we have already upon our statute books affecting the matter of the manufacture and sale of imitation butter, without discussing in any way the subject as to its merits, which has been already ably done by many of the gentlemen present. In the Legislature of four years ago, a bill was prepared governing the sale of imitation butter, by which I mean suine, butterine, and oleomargarine. That law was vetoed by the Governor. That was the first law that we had upon the subject. The second law is the one which we have at present governing the sale and handling of imitation dairy products. I apprehend that the bills which have been presented here are very little better, in many respects, than the law which we have now. I have been in correspondence with parties in New York city and also parties in New York State, in regard to the operation of the New York law. They lay great stress upon the fact that they have a dairy commissioner who is empowered to enforce this law. I believe that, without a commissioner appointed to carry into effect any law that we might have, it would be impossible to improve upon our present law. I am very sorry to say that, from information which I have from a very excellent source, it is altogether likely that the law of New York will not be sustained by the court of appeals. I had expected a telegram this morning, and shall probably receive it some time during the day, from Mr. Brown, the dairy commissioner of New York, in regard to the matter. I understand that it is to come before the court of appeals very soon—I should judge (from information that I have had) within, possibly, the next week or two. I would say this to your Board, that it would seem to me best, so far as the Legislature of Pennsylvania is concerned, to await, if possible, the decision in New York of this matter. So far as any prohibitory law is concerned, if we cannot appoint a commissioner to carry out the provisions of that law, I would consider such a law as entirely useless.

Mr. BEEBE of Venango. Mr. President, we can do this. The Constitution forbids legislation creating such State offices, but they can be provided by the counties. There are two ways before this Board: One is as provided in the bills for county supervision, and the other as suggested by His Excellency—the latter as has been read by Mr. Reeder; the other proposes county inspectors. Those two are suggested here to-day, and the only two; the first by county supervision, under proper authority, and the second, as read by Mr. Reeder, by policemen and constables. I was about to state that I could illustrate the latter method as being similar to the requirements of a constable who is required to make return to the court of quarter sessions as to illegal sales of liquor. That is one method. There is nothing to hinder a citizen from prosecuting, at any time, offenders by taking them before a justice of the peace and having them bound over for trial in the court of quarter sessions at the regular terms. In fact, it would be the duty of the constable, as an officer of the law, to make these returns. There is nothing to hinder any citizen making complaint against an offender and have the party offending bound over. In fact, it is the only method, because our courts have decided that such returns cannot be made to the court of quarter sessions without a preliminary hearing before a magistrate. Of course, in the various municipalities, in the large cities where these interests predominate, an inspector could be appointed under an act of the Legislature who would be practically able to enforce the law. The public necessity would require it; the public sentiment would demand it, and that is just where the oleomargarine business mostly affects it. In the smaller counties, in the remote districts, they know very little about oleomargarine, and care less.

My own idea upon an examination of that (the New York act) was that it would inevitably be reversed from the simple want of sufficient title, not including those causes on which legislation would be justified. The very title of the act itself is not sufficient to create what would be justified in being prohibitory. A simple act to protect dairymen in the manufacture of butter as against other products is a simple absurdity; so far as this discussion to-day tended that way, to me, as a lawyer, it seemed very weak indeed. No industry can be protected as against another legitimate industry.

Mr. FULLER. This subject was under discussion at our meeting held at Doylestown in May last. Judge Watson, a member of our association, argued the matter very much as the gentleman (Mr. Beebe) here does; and I felt obliged to take that position. I had the honor of offering a resolution, at that time, that the whole matter be deferred until our annual meeting, which occurs next week. We appointed Mr. Reeder, the gentleman who has reported to this Board to-day, as the chairman of the committee to report to us next week. The matter rests in that way, so far as our organization is concerned. We desire very much to coöperate with your Board.

Mr. BEEBE. To conclude what I have to say, I would add that although the New York Court of Appeals may declare that law unconstitutional and set it aside, it may be done upon the ground that the title and draft of the act itself are defective.

Mr. EDGE, (Secretary of the Board.) Mr. President, I think it very important that a bill of some kind should be introduced into the Legislature at once. It doesn't matter what you introduce, if you have the title that you want. There will be a great hostility to it on the part of the oleomargarine men, and any delay will be a great disadvantage. Every day of delay puts us back farther and farther. If we introduce a bill now, have our title right, and put it into the hands of the committee, by the time that bill comes up on second reading—which is the only time you can amend it—then Mr. Fuller, and all others of the association who desire, can get the bill in such shape as they want it. Many here know how easily a bill can be killed by amendment, which causes delay.

A MEMBER. Judge Pratt's minority report, in New York, coincides exactly with Mr. Beebe's version of this matter. He takes the ground that the title of their act does not include that particular feature which he says we ought to embody in ours in order to make it constitutional, and that is that its use is detrimental to health. The New York bill does not include that feature.

The PRESIDENT, (Governor Pattison.) The efficacy of this law, as of all other laws, will depend upon the right enforcement of it by the man whose duty it is to execute it. That has been the history of all the laws we have; many to-day stand upon the statute books a dead letter because they are not enforced. The easiest, and, perhaps, the best method to adopt, is that when a man fails to perform his duty, the sooner you remove him the better. You have to depend upon some one, whether in the county or in the city or anywhere else, for the enforcement of your laws; and if you can reach that some one by speedy remedy, it is the best way.

HISTORY.

There is some doubt as to when the first attempt was made to manufacture imitation butter; some ascribe it to the necessities which arose during the siege of Paris, and nearly all authorities agree in ascribing the invention to a Frenchman. The first public record of it appears in a patent granted to M. Mege by the English government under date of March 16, 1869. In this country, it appears that a patent was granted to H. Bradley in January, 1871, but this patent does not cover the material under the name of butter; the Bradley process made no greater claim than to make the grosser fats equal to lard for cooking purposes by a patent process. Later in the same year, a Frenchman, W. K. Peyrous, obtained a patent under a claim to make "the finer animal fats equal to the best lard, for cooking purposes only;" this was supplemented by the further claim that the process made these fats "as easily digestible as lard and butter." Two years later, (May, 1873,) we find that E. Q. Parafe obtained a patent for a process of manufacturing what the patentee styled "oleomargarine;" this patent was afterwards purchased by a large manufacturing company in New York, and Parafe installed as its president. This, so far as is known, was the first "imitation butter," and, to a limited extent, was then used as butter, but the process, being far from perfect, left the fraud so apparent that but little of it was used as a substitute for butter, except for cooking purposes. The application of heat to the Parafe compound, in all cases, gave off the odor of tallow, and, when cut cold, it broke away before the knife in a manner which clearly indicated its tallowy origin. During the same month and year, (May, 1873,) the Mege patent was recorded in this country, and a second factory started under its protection. This patent had certain peculiar claims which indicated a much more serious rival to legitimate butter; unlike all other patents, this provided for the extraction of the oil from tallow, lard, and other fats at a low temperature, and, after mixing with milk, (either sour or sweet,) churning until it assumed the semblance of butter. With Prof. Mott as its champion, numerous experiments were made to ascertain the best temperature for extracting the oil from the fats, and at the same time avoiding the extraction of their grosser parts; this was found to vary from 100 degrees to 125. After a large number of tests, it was considered that enough had been learned to warrant an application for a new patent, which was issued just one year after the original patent. In 1876, J. W. Cosin took out letters-patent for an "imitation butter," and, of all the processes, his seemed to produce by far the better substitute, and, for the first time, awakened our dairymen to the sense of their danger from such competition. From time to time, the owners of the Cosin process added to it by patent, but it was finally entirely absorbed by one of the other patents, and now is not recognized as a separate plan. Since 1876, the process has, step by step, and patent by patent, increased in the intricacies of manufacture until the list would fill a small-sized volume.

LEGISLATION.

Immediately after the organization of the Board of Agriculture in 1877, one of the first things which engaged the attention of the Secretary was the manufacture and sale of imitation butter, (the manufacture of imitation cheese had not then commenced,) and a plan was formulated for a thorough examination of the whole matter, the full report of which will be found in the annual report of the Board for 1877, pages 186–201, in which the reader will find a full account of the manufacture, and its cost and effect on the market for dairy butter. At that time the only product (imitation) known to the trade was oleomargarine made from tallow only; at that time the condition of its manufacture was such that it was easily detected by a casual examination, and the application of heat would at all times show its derivation.

An act was drafted in the office of the Board, and, after having been submitted to most of the agricultural organizations of the State for suggestions and amendment, was presented to the Legislature of 1878, and, receiving the assent of both branches, was signed by Governor Hartranft May 22, 1878, (P. L., pages 87–88.) In 1880 and 1881, it was found that the knowledge of the manufacture of these compounds had greatly increased, and had extended to the introduction of other kinds of fat, and that the imitation had extended to cheese. To cover this adulteration, another act was drafted so as to include all dairy products, but (act No. 550, House of Representatives, "An act for the protection of dairymen, and to prevent deception in sales of butter and cheese,") this act failed to receive the approval of Governor Hoyt, and thus failed to become a law. In 1882, the evil having still further increased, another act was drafted, and, after receiving the approval of both branches of the Legislature, was approved by Governor Pattison May 24, 1883, (P. L., pages 43–44.) None of these acts were prohibitory in their nature, but were directed to the one point of compelling the manufacturers of imitation dairy products to sell them for what they really were, and not as the legitimate products of the dairy. All having signally failed in this object, other plans were adopted, and during the present session of the Legislature, two bills (both prohibitory in their character) were introduced.

The question of prohibitory legislation in relation to this class of imitation products had been tried in Missouri and New York. In the former State, the right of the Legislature to enact prohibitory legislation of this kind has been affirmed by the highest courts of the State, and in New York the same right has been affirmed by the Supreme Court of the State. The United States court of Kansas has also affirmed its constitutionality ; Vermont, New Jersey, and Delaware, in company with other States, have thus far confined their legislation to that of a restrictive class, and are now awaiting the test in other States.

In the New York Supreme Court, the case of McGann was brought up on appeal from the lower court, the lower court having ruled that the New York law prohibiting the manufacture of imitation dairy products was constitutional, the higher Court sustained the decision, in an opinion by Justice Dykman, and concurred in by Justice Barnard. The opinion is as follows:

"The defendant was convicted for violation of the sixth section in manufacturing and selling oleomargarine, designed to take the place of butter, but he did not pretend or represent that it was butter, the purchaser knowing how it was made, and of what it was composed, namely: animal oil extracted from beef tallow. Defendant appealed from the conviction on the theory that the law was intended to apply only to a case of deception in the manufacture and sale of an article. The Court holds that the language employed will not admit of that wild interpretation. The prohibition is absolute, says the Court, and it then reviews the question whether the Legislature possessed the power to make the law. Under our system of government, the Court says, the uncontrolled power of legislation resides in the people, all sovereignty and supremacy having devolved upon the people in undiminished plentitude on the separation of the colonies from the mother-country. But they don't exercise the sovereign power directly. All the people of all the States established the general Government by the adoption of the Constitution of the United States, in which they delegated to the National Government certain enumerated powers. Then, says the Court, the people of each State established State governments, and invested them with all the power which they did not expressly withhold; so that all the power not conferred on the general Government belongs to the State governments or to the people. Without constitutional limitations, the power of the Legislature to make laws would be absolute, because the law-making power is entrusted to the legislative branch of the government. But the people have set limitations to the law-making power, one of which is that no person shall be deprived of life, liberty, or property without due process of law. If the law against oleomargarine is unconstitutional, it is because it offends against this limitation. The court of appeals has held, says the Court, that the Legislature has power to prohibit traffic in spirituous liquors on the theory that it may prohibit and suppress any traffic injurious or demoralizing either to public health or morals, or in its tendencies and consequences, and that the decision of the Legislature on the question of fact involved is final and conclusive. The Supreme Court of the United States enunciated the same doctrine in the Slaughter-house cases in Louisiana. The Court holds that these cases are sufficient to sustain the constitutionality of the law affecting oleomargarine. The presumption was that the legislative action in respect thereto was deemed necessary for the welfare of the public, and it cannot be abrogated by the courts. With these necessary assumptions, says the court, this law falls easily within the police power of the State, the underlying foundation of which is the principle that all property must be so used that it shall not become injurious to others. The enactment of the law was within the scope of the legislative power, and the law prohibits the manufacture and sale of oleomargarine as an article of food to take the place of butter. The defendant being convicted of a violation of its provisions, in the view of the Court, the conviction must be affirmed."

From this opinion Judge Pratt dissented, and gave the following reasons for so doing:

"I am constrained to dissent from the views of a majority of the Court in this case upon the following grounds: If section six of the act under which the defendant was convicted is to be construed as an absolute prohibition of the manufacture of pure and wholesome oleomargarine, unconnected with any design to deceive the public or simulate dairy butter, it is unconstitutional, as being within the prohibition of article one, section six, of the State Constitution.

"There are certain well-settled principles to be kept in view in considering this class of questions. Before a statute can be annulled by the Courts, its repugnancy to the Constitution should be clearly demonstrated. Neither can Courts sit in review of the discretion of the Legislature or determine the wisdom or propriety of legislative action, and every intendment is in favor of the validity of the statutes. In Bartholf *vs.* Reilly (74 N. Y., 516) it was held by the court of appeals 'that no law can be pronounced invalid for the reason that it violates all notions of justice, is oppressive and unfair in its operation, or because, in the opinion of some or all of the citizens of the State, it is not justified by necessity or designed to promote public welfare. We repeat, if it violates no constitutional provision it is valid and must be obeyed.' It is equally settled that whether an act is obnoxious to the Constitution is a question for the Courts to pass upon, and for that purpose it is competent for the Court to look to the circumstances and purpose under which and for which an act is passed.

"That the substance from which oleomargarine is made is property cannot be disputed. Neither can it be claimed that this act was passed to protect or preserve the public health, for the reason that it nowhere appears that such was the purpose, and an entirely different purpose does appear in the title. If we are to seek for an expression of the purpose in the act itself, it is plain that its object is to create and protect a monopoly in the manufacture of dairy butter and prevent any successful competition therewith. In this view, it deprives the owner of the substance from which oleomargarine is made of the beneficial enjoyment of his property and fruits of his lawful labor. It was held *in re* Peter Jacob (*19 Weekly Digest*) that it is not constitutionally competent for the Legislature to deprive, by an arbitrary enactment, a laborer in any lawful vocation of his right of work, in his residence or in his own way, except for purposes of police or health regulations.

"It is true that the statute then under consideration recognized the legality of the labor, and only restricted it to certain places, while this prohibits all the labor or manufacture, if the article is to be used thereafter as a substitute for butter; but the principle is the same. In both cases the citizen is deprived of the beneficial use of his lawful property.

"Until the Legislature, in the exercise of its inherent powers to enact police and health laws, prohibits the manufacture of oleomargarine, it seems to me a citizen has a right to make any pure and wholesome article of food and sell it for what it actually is, and it is immaterial what lawful use shall be made of it afterward. If a man is too poor to buy good butter, I see no objection to his using oil, cheese, or honey, or any other substitute for butter.

"A law prohibiting the making of an iron rake, to be used as a substitute for one made entirely of wood, could be passed with just the same legal effect as a law providing that oleomargarine should not be used as a substitute for butter. I do not claim that the Legislature cannot do all this, but that it can only do it to protect the public health. Assuming even that it may pass such a law, if, in the exercise of its discretion, it deems it best for the public health, and that the Courts cannot review such an exercise of discretion, however unwise it may be; this law, however, was not passed under the exercise of any such discretion or for any such purpose, nor can we indulge in the presumption that such was the purpose of the act when we read the title of the act itself.

"The whole question as to the constitutionality of this section, therefore, turns upon the point whether, the Legislature having passed this statute, the Courts must assume that it was passed for the purpose of protecting the public health. In my view, it was not passed for that purpose, and is, therefore, not to be upheld unless another construction can be placed upon it. In the title, the Legislature announced its purpose to be 'to prevent deception in the sale of dairy products.' If the title is to be read in construing the sixth section, then it must be held to relate to and prescribe only deceptive simulations and spurious impositions upon the public, or to an article made with design to deceive the public, and cannot be held to include a wholesome and pure article of food, openly and honestly made with a design to sell it for exactly what it is, and without any design to deceive the purchaser.

"In the latter view, an indispensable element in a conviction would be some intent to deceive or some act that might operate as an imposition upon the public, as a 'deception in dairy products.' Merely making pure oleomargarine butter, and exposing it for sale as such, without any motive or attempt to pass it off as genuine dairy product, would not come within the purview of the statute, the purpose of which is to prevent deceptions. The act, in the severity of its penalties, in its casting the burden of proof upon the defendant, to rebut a presumption of willful guilt arising from the doing of any act prohibited therein, may well be held to impose its penalties only when oleomargarine is manufactured for sale, or sold, or designed to deceive the public. If the latter is the correct view, this conviction cannot be upheld, as no such case was made out.

"I have not examined or cited authorities, as I have assumed the utmost that can be claimed in favor of the absolute power of the Legislature. While the subject is one that has been frequently before the Courts and elicited much discussion, it does not seem to me that the present case requires any critical examination to present the legislation involved. Whichever construction is placed upon the sixth section of the two herein stated, it is clear the conviction must be set aside."

It is evident, from the line of argument pursued by Judge Pratt, that he considers the act one of class legislation—the dairyman against the tallow and lard manufacturer—and that the question of injury to public health did not enter into the question. It is unfortunate that the title of the act was, in itself, very defective, and, to a certain extent, invited the opinion of Judge Pratt.

"An act to prevent deception in sales of dairy products" was open to a charge of class legislation, while one "for the protection of public health" would not have incurred such a decision; hence we infer that the decision in the New York case does not in any way affect the broad question of the right of the Legislature to enact laws for the protection of the public health. The real question, then, is: "Are these compounds injurious to the public health?" And it is on the answer to this question that the decision must eventually turn. In the discussion before the Board at its annual meeting, one of the delegates present, who is in a position to know practically the facts as stated by him, gives an account of the manner in which the material is collected. If we accept his evidence, we must inevitably conclude that a compound resulting from material thus collected is injurious to the public health.

So far as the pure oleomargarine, made from nothing but beef tallow, is concerned, the question of injury to public health might be disputed; but when it comes to other compounds—suine, butterine, and lardine--made from lard and other fats, the surroundings are materially altered, and in the alteration most seriously affect the answer to our question. With these, the oil or liquid portion of the lard (and other fats) is extracted by pressure at a temperature too low to destroy the germs of disease which may have existed, and which may thus be transferred to the human stomach.

If, on the other hand, it is decided that these compounds are not injurious to public health, we think the right to ask for prohibitory legislation falls. If we have no other grounds on which to ask that the manufacture of imitation butters and cheese be prohibited than that it interferes with the dairy business, and lowers the market value of its products, our cause is very much weakened and materially injured. That the sale of these products lowers the price of legitimate butter is not sufficient basis for prohibitory legislation, for (if not injurious to health) the non-producing citizen has a perfect right to the benefit to be derived from the competition. If deception in the sale is all we can legitimately complain of, our just claims cannot go beyond restrictive legislation, which shall insure to our citizens the right to be protected in their purchases, and to obtain what they wish to purchase. So long as these imitation products are sold on their own merits and under their own names, there is no deception practiced and no right of prohibition. If our views are correct, the whole question then turns upon that of injury to public health, and we regard the evidence before the committee of the New York Legislature as having settled the question in the affirmative, hence we assume that it is perfectly proper to enact prohibitory legislation.

Having decided that prohibitory legislation is proper, we are next met with the important question of how it shall be secured. Our restrictive laws have hitherto proved a failure, not from any weakness of their own, because no one carried them out. Admitting the constitutionality of the New York act, we cannot in Pennsylvania follow it up, for our Constitution forbids an inspectorship. How, then, can we utilize prohibitory legislation without inspection? All will admit that a prohibitory act not enforced is even weaker than a restrictive one in the same condition. The passage of a prohibitory act may be more easy than its enforcement. If it is the duty of no one to see that it is enforced, will it prove of any more use than our present restrictive act? If not, will it not prove a constant source of annoyance to both parties? To the manufacturer, because he will at all times be liable to prosecution arising from petty spite rather than from a desire to see the law enforced; to the dairyman, because it gives him a security which is but theoretical. Such an act may possibly do injury to both parties and benefit neither.

INVESTIGATION.

The question of the propriety of prohibiting the manufacture and sale of imitation dairy products being before the New York Legislature, the Senate appointed a committee to give the subject a complete investigation. This committee presented the following report, and submitted the evidence taken by them, which occupied three hundred and ninety-five printed pages. The report of this committee, as made to the Legislature, (January 30, 1884,) is as follows:

To the Senate:

Your Committee on Public Health, which was authorized by the resolutions of this body passed on the 24th day of January, 1884, to make an examination as to the adulteration of food and dairy products, hereby report as follows:

That, immediately upon its appointment, it prepared notices indicating the duties which had been imposed upon your committee, asking information and suggestions as to the matters above stated, of which notice the following is a copy:

STATE OF NEW YORK,
SENATE CHAMBER, ALBANY, *January 30, 1884.*

MY DEAR SIR: The Senate, on January 24, passed the following resolutions:

WHEREAS, It is alleged that imitation and adulterated butter, suine, and oleomargarine butter, and adulterated dairy products, etc., are manufactured and sold in violation of law;

And whereas, Such sales are injurious to producers and dealers in dairy products, and injurious to public health;

And whereas, It is of vital importance to the honest and legitimate producers and dealers in the products of the dairy, and also necessary for the better preservation of the public health that such sales be stopped: therefore, *Resolved*, That the standing Committee on Public Health be, and it is hereby, directed and empowered to investigate the alleged illegal manufacture and sales of imitation and adulterated dairy products and the effect of the sale and use of the same on the public health. with power to send for persons and papers. Said committee is hereby empowered to employ a stenographer, experts, and such counsel as it may deem necessary for the thorough discharge of the duties hereby imposed, and the said committee shall have full power to extend the investigation to any and all imitation and adulterated drink and food, and it shall report its conclusions, together with such recommendations as it may deem proper, upon the subject.

It is known that very extensive adulterations of food and drink products are practiced under different forms, and this is especially true of dairy products. It is desired that information bearing upon these questions be furnished at as early a date as practicable. You are, therefore, requested to furnish to H. R. Low, chairman of the Senate Committee on Public Health, any facts known to you bearing upon the following questions:

First. Is oleomargarine, butterine, suine, lard cheese, or any other product in which milk, butter, or cream is in part used, made or manufactured in your locality?

Second. In such manufacture, what proportion of milk, cream, or butter is used, what is the product called, and at what price is the same sold?

Third. Are any of the above-mentioned products sold in your locality? In what form or packages are the same put up, and are they sold at wholesale or retail, and in what manner are the same marked, identified, or labeled?

Fourth. What knowledge or information have you of the manufacture or sale of any of the above-mentioned products at any place or places within this State, and what efforts or attempts have been made to prevent the manufacture or sale of the same in violation of existing laws?

Fifth. Have the laws now enacted to prevent the sale of the aforesaid products as butter or cheese been enforced and executed, and, if not, give the reasons why violations of the law have not been punished.

Sixth. Information is specially sought as to the quality of the milk supply to the large towns and cities of the State, and, also, as to the milk sold or supplied to creameries, cheese factories, condensing establishments, etc.

Do the producers furnish, in the first instance, a prime and unadulterated article from healthy cows, fed upon good feed and pure water? If exceptions occur to this rule, where and what are they? Do you know of instances where the milk product is contaminated by tainted wells or sewage, by impure or unhealthy feed, or brewery products? Are cows confined in stables or filthy sheds, or yards in or near the large cities, and fed upon refuse or fermented products, and is the milk from the same sold upon the markets? Do grocers, or milk-dealers or other parties water the milk sold by them, or adulterate the same in any manner, and if so, what substances are used for such adulteration?

Sixth. State specifically any facts within your knowledge bearing upon any adulteration of any food or drink products.

H. R. LOW,
Chairman Senate Committee.

SENATE CHAMBER, *Albany, N. Y.*

From the large number of inquiries and replies, it soon became apparent to your committee that adulterations of large numbers of food and drink products was being extensively practiced in different portions of the State and that the field of inquiry was too extensive to be investigated within the limited time in which a report would necessarily have to be made if any legislation founded thereon was to come from the Legislature during the present session.

Your committee, therefore, has confined its inquiries principally to the adulteration of dairy products, and especially to milk and butter; and in regard to these products, it has developed the existence of wholesale adulterations of the most alarming character, most seriously affecting the consumer, and largely endangering and lessening the value of the landed interest and property of the citizens of the rural districts of the State.

The adulteration of natural butter by various intermixtures of lard oil, tallow oil, bene oil, and other foreign ingredients of coloring matter, etc., has been practiced to such an extent and under such fraudulent cover that the spurious product has found its way into almost every town and city in the State, to an amount nearly equal in quantity to that of the whole production of natural butter sold in our markets.

The fraudulent imitation has been so ingeniously contrived and executed that ordinarily it cannot be distinguished from natural butter by the unsuspecting purchaser, and even experts testify that the better qualities of the counterfeit can only be detected by chemical analysis; and thus it finds its way to the tables of thousands of consumers who suppose they are buying genuine natural butter, and never suspect that they are eating a concoction of oils and raw fats.

To test the extent and the fraudulent character of the deception, your committee had purchased at random, in the cities of New York and Brooklyn, thirty samples, all bought as pure butter from retail grocers.

The chemical analysis made by Dr. Love, one of the State analysts, showed that twenty samples out of the thirty purchased were oleomargarine, and that most of them had hardly a trace of pure butter in the admixture.

In a few was found a small percentage of pure butter, but in no case exceeding ten or fifteen per cent.

The purchaser in every case called for pure butter, and in no instance were there any labels or notices of any kind indicating that a spurious object was being sold to the public.

The witnesses all testified that the sales were very general in all parts of the city, and that it was very largely purchased by saloons, boarding-house-keepers and second class hotels; the poorer qualities selling for the most part to laboring people, at from twenty to thirty cents per pound, and the better grades often as high as forty or forty-five cents.

The cost of manufacture varied from twelve and one half cents to eighteen cents per pound, the great bulk costing about fourteen cents, and retailing at about the cost of good dairy butter.

The retailer, making so large a profit, could at any time undersell the dealer in natural butter, but lest a low price might excite suspicion of the purchaser, it was kept as nearly as possible to the price of natural butter, the price being reduced only when necessary to drive the genuine article from the market.

In nearly every case, except when purchased by boarding-house or saloon-keepers, the consumer is deceived and defrauded, while the customer who eats it in the saloon or boarding-house is in like manner imposed upon.

The manufacture is chiefly carried on in New York and Brooklyn and two or three other of the larger cities in the State, in some cases the process being open to inspection, when so desired by the committee, while in others the manufactories were locked and admittance refused to the agents of the committee.

There are several concerns that are each manufacturing in this State over three million of pounds annually, largely from fats brought from Chicago and other Western cities, and by oils imported from France and Italy.

The bulk of the article, however, is manufactured in Chicago and other Western cities, and is made almost entirely from lard oils, mixed with a percentage of genuine butter, and the mixture colored to represent the same, is sent and received at New York as butter, to the injury, as your committee believes, of the dairy butter of the State. The most intelligent witnesses testify that it has almost driven the State dairies out of the markets and compelled a large proportion of the farmers to abandon the business of making butter, inflicting a loss upon the dairy interests of the State of from five to ten millions of dollars per annum.

No accurate computation could be made of the quantity manufactured and sent into the State, but from all sources of information available, the best judges testify that it will reach the enormous quantity of forty millions of pounds annually. This fraudulent product is made under different names and forms, the distinction consisting principally in the different percentages of oils and fats used in the process.

It is not "a *manufacture*" at all, in the sense in which that term is ordinarily applied, but it is simply a mechanical mixture of different fats and oils, to which coloring matter is added to máke the imitation as nearly perfect as possible.

No mechanical change of any kind takes place, nor is there any physiological or dietetic difference in any of the ingredients used in making the oleomargarine, or butterine, as it is sometimes called, except such changes as occur from the admixture of alkalies, nitric acid, and other poisonous chemicals which the evidence shows are used in rendering the fats in the process of manufacture, and which are believed to be injurious to the health of consumers.

Any one may have the same article precisely, so far as its chemical or physiological properties are concerned, by mixing upon his plate, at his breakfast table, a given amount of the raw, uncooked fat, (which has been converted into oil at a low temperature by hydraulic pressure,) with a small percentage of natural butter and a portion of the sesame or cotton-seed oil, together with the coloring matter and salt to give it a genuine look and make it palatable. Where the fat has been rendered, in connection with the solution of nitric acid, and the coloring matter prepared by mixing with soda or other alkaline substances, you have in the whole combined what is now made and sold as butterine and oleomargarine.

We have said before that the extent to which this fraudulent article has been introduced into our State is cause for serious apprehension and alarm. Not less vicious in its effects upon the moral well-being of the community, arising from fraudulent sales and disregard of the law, than upon the material interest of the State.

We have said before, as a fact, so far undisputed, that the ordinary butter of the State, excepting the very best grades, is rapidly disappearing from the market. The witnesses testify that many people have ceased to use butter of any kind by reason of the danger of deception, and the constant uncertainty as to the identity of the article purchased and used, while the exports of natural butter, now made at ruinously low prices, are in danger of being broken up and destroyed on account of the suspicions obtaining abroad in regard to these adulterations.

In the same manner, the export of oleomargarine and butterine has been completely cut off on account of the deception practiced upon the buyers, so that instead of wealth coming to this country in payment of the exports, we are ourselves paying large sums for foreign oils imported from France and other countries with which to make this spurious article.

The effect of this deception is most demoralizing to public morals and tends to lower the standard of honest business and fair dealing; many dealers, whose sense of honor and duty were outraged at the thought of palming off this product upon the public, have been forced to succumb in order to save their business from ruinous loss.

Thousands are now unwillingly engaged in the sale of the product who would gladly welcome its total prohibition and removal from the market. This practice of selling an article under a fraudulent cover, and against the prohibition of the laws of the land, is fast inducing a carelessness as to moral obligation and a disregard of all laws. Dangerous and vicious as the practice has already become, its evil consequences are of small import compared with the danger which is threatened in the near future. The practice which has already corrupted and demoralized the very large proportion of grocers and retail dealers, and which has only been resisted by men of the most sterling integrity, is fast extending itself to creameries and other producers in the West. There is no evidence that the farmers of our State are engaged in the making of this product, but it is in proof that in many of the creameries all over the country the deception is being practiced, and the time is not far distant when, if the business is not laid hold upon with a strong hand, the warning words of Charles Boschen, one of the retail dealers, and one of the most upright men of the trade, will be a literal truth.

When asked what would be the effect upon the community if this practice was not checked, he made the following significant reply: "That every producer and manufacturer would become a counterfeiter, and every dealer a swindler." Mr. Boschen further said, "The oleo retailers can buy their stuff from twelve to fifteen cents per pound, and the butterine from eighteen to twenty cents less than the honest merchant can get butter for; * * * what sophistication is at the bottom of the oleo racket no one knows." "There is my assistant; he can tell you that he spent two years in a factory of the latter character; and does not know to-day what chemicals enter into the process, or went to the completion of the lie that that firm foisted upon the market."

"We cannot compete with the frauds; they are ruining Washington market and make people suspect all dealers in it, for they roll up their manufactured article and sell it as genuine butter, beating the real article in every case from ten to twelve cents per pound."

N. M. Blish, the president of the Stamford Board of Trade of Delaware county, said: "There is a general feeling of alarm, because there is no limit to the manufacture of this spurious product, and if it takes the place of our butter, to any extent, it can push us entirely out of the market; not only that, but it is discrediting our markets abroad, it decreases the value of our entire property, and even goes further than that—it affects the entire prosperity of our country because our product is almost exclusively butter."

Benjamin F. Van Valkenburgh, produce dealer on Read street, New York, testified: "From the best information I could get, I made an estimate of something between one hundred and fifty thousand and two hundred thousand packages of fifty-five pounds each, which were shipped to New York in 1882; and between two hundred thousand and two hundred and fifty thousand packages in 1883. Oleomargarine made its appearance upon the market about five years ago. It has nearly ruined the sale of the middle grades of butter. Some men are retailing oleomargarine for twenty cents per pound, others are charging as high as thirty cents, and others tell me they are selling butterine at thirty, thirty-five, and even forty-five cents, all out of the same tub. The goods are made to imitate butter as nearly as possible, and they are one of the best counterfeits ever got up in this country. Oleomargarine affects the New York State farmer to a greater extent than any other class of people, for the reason that the Western farmers ship their butter fresh from the churn and get the bulk of their goods in the market during the summer months, when oleomargarine is not used to any great extent, while the New York farmer brings his product late in the fall, and comes into direct competition with butterine and oleomargarine; beyond all question, it lowers the price of New York State butter from five to ten cents per pound. These products could not be sold for what they really are in my opinion. Seventy-five per cent. of all butter received from Chicago is butterine."

James H. Seymore, of 144 West Fifty-third street, formerly president of the New York Mercantile Exchange, testified: "The manufacture of this article has had the effect of reducing the price of butter and a detrimental effect upon the trade generally. If these goods were not sold, I think butter would be a little higher, but, at the same time, it would encourage the production of butter; the present condition discourages good butter-production very much. Farmers cannot make butter from the live cow to compete with the dead-hog product, that is certain. The effect will be to drive butter from the business, while it also discourages the consumption of butter on the part of the people, who are afraid of getting the adulterated article. That is the case in this city now, and it is a very serious question indeed. It has come with some people not to have any butter on the table at all. 'Tis deception from beginning to end, and there is no disguising the fact."

It begets a carelessness as to moral obligations and a disregard of all laws.

The tendency will always be to extend itself to butter-producers among farmers and creamery men, who, like jobbers and retail dealers, will feel obliged to make the spurious article instead of butter to save themselves from ruinous loss. Another result, very much to be deplored, is the conviction among consumers generally that their rights are outraged, their confidence imposed upon by the sale of this fraudulent mixture, and a general feeling of unrest and uncertainty is fast coming over the whole community. Men sell the article who sport the label, quoting again the words of Mr. Boschen, "positively selling only genuine butter." And this competition, a falsehood, a fraud, a swindle that ought to be punished, has driven legitimate business about so that I, for one, think of quitting it. I can no longer contend against this evil. How does it affect the public?

The public are cheated all ways. The fraud drives them for safety to seek high-priced articles, but even then they get cheated, as there are many who have no scruple to putting up their lie to the highest price possible and declaring it to be genuine. As a result, the public is fairly driven from the market. They view all qualities and prices with suspicion.

The butter-producers lose heavily because the medium grades are now unsalable and have to be shipped at a loss.

"The injury thus entailed on the granger is enormous. * * *

The gross receipts of the genuine butter trade in New York are fifty per cent. less than they would be but for the fraudulent dealing. The retailer of the 'lie butter' gets seventy-five per cent. (profit) on his transactions, and competition against him is no longer possible. Many of the smaller dealers in the genuine article have been ruined or driven from the markets, and customers, seeking safety, have voluntarily gone or have been pushed into the hands of the cheats."

Mr. Hearn, of the Fulton market, said:

"The legitimate dealer cannot contend against the bogus dealers. Farmers suffer most from the unfair competition, killing the value of one of their best, and, formerly, most reliable products. Fraud butters are frequently marked high to catch the eye of customers, even at from twenty-four to thirty five cents per pound, placing all grades of butter under equal suspicion and in equal disfavor. A man who buys has a right to what he wants to buy. * * It should be sold for what it is, and imprisonment should be the punishment for frauds that destroy confidence, injure the moral tone of the market, hurt innocent producers, and drive customers away. As to the injurious physiological effects resulting from the daily use of this spurious compound, there is a great difference of opinion. The effect on the human system of its continued use for an extended period has not yet been sufficiently tested to afford an intelligent conclusion."

In reply to a question as to its unwholesomeness, a gentleman who had been two years in an oleo factory said:

"I can only say that no man who ever worked in a factory would eat a morsel of it. We often dipped our bread in the rendered lard, but never used it after it had gone through the finishing process, where it is treated with chemicals."

Another worker said:

"It may not be unwholesome—the process is so secret that it is said the foreman did not know it—but I like my diet by itself, and get drugs at the chemist's in the natural way. I would not taste the oleomargarine after it was finished."

Some of the witnesses refused to give the secret process, or the names of the chemicals used in the preparation of the product. Others admitted the use of nitric acid, one of the most powerful chemicals used in manufactures and in medicines. It is a deadly poison when taken in concentrated form, and, even when diluted, must be injurious to good health and digestion.

The secret of rendering and preparing the lards and fats which has been so carefully kept is, beyond all question, the use of nitric acid or other chemicals which destroy the natural smell, renders the article more insoluble and indigestible, and serves as an agent to prevent decomposition or putrefaction.

Nitric acid is one of the most powerful deodorizers, ranking with carbolic and sulphuric acids, and largely used by physicians and others for that purpose.

The following extracts from the testimony of Dr. H. A. Pooler, of Goshen, will show its effects upon the human system:

"Nitric acid is produced by the action of sulphuric acid upon nitrate of potassa, about equal parts. It is a powerful caustic. It destroys animal tissue rapidly, and almost irreparably, when it comes it contact with it. Upon the human stomach it is a deadly poison when taken in overdoses; when taken in a diluted form for any length of time, it produces effects similar to that of mercury. It stimulates an excessive flow of the secretions, and poisons the system generally. * * It is a powerful disinfectant, and was once used in Europe to prevent the spread of disease and disinfecting the wards of the hospitals. Its use as a disinfectant had to be discontinued because of its deleterious effects upon the patients in the wards."

Stille's "Materia Medica," vol. I, page 242, has the following: "It is a powerful caustic, destroying all animal tissue it comes in contact with. The enamel of the teeth is rendered very white at first, and is partially destroyed by this acid."

Dr. Pooler further testified: "Oleomargarine treated with nitric acid would be dangerous and injurious. Lard is pork in a measure, and partakes of the essential qualities of pork. Lard is produced from the hog, and the hog is liable to many diseases, such as hog cholera, trichina, and other varieties of diseases. As to its digestibility, it ranks sixth among the fats. The first and most soluble oil is cod-liver oil; second, cream; third, butter; fourth, the fat of fowls; fifth, beef fat; sixth, lard. The heat of the stomach is not sufficient to melt it. It requires a temperature of 110° to 118°. Natural butter liquefies in the stomach at from 94° to 96° Fahrenheit."

The following table gives the time required to digest different foods as taken from the experiments of Dr. Beaumont with Alexis St. Martin. See Dunglison's "Medical Dictionary," page 302.

		Time of digestion.	
Fat.	*How treated.*	*Hours.*	*Minutes.*
Butter,	Melted,	3	30
Pork,	Boiled,	5	15
Beef suet,	Boiled,	5	30
Mutton suet,	Boiled,	4	30
Beef (lean),	Boiled,	3	36

It will be conceded that some manufacturers take pains to get the best possible product from the materials used, and exercise every possible precaution to eliminate the acids and chemicals from the oils in the work; but even the most approved admixture of lard oil with the other ingredients named above can hardly be regarded as a food to take the place of natural butter, especially for children or persons of sedentary habits or in delicate health. Many persons are made ill by using it, as witnesses testified. All hog products are hard of digestion, as is also tallow oil when compounded with natural butter. In making this product, the fats are not subjected to a degree of heat that would destroy any living germs or eggs that might be injurious to health and life. Such destruction could only take place at a high temperature, while these fats are never heated above 140° of Fahrenheit, and the oils are then extracted by hydraulic pressure. The greatest danger, however, will arise from the hasty or improper rendering or mixing of the compounds, which would almost necessarily result when such large quantities are daily made with the kind of labor which must necessarily be employed. Dr. Edwin Waller, analytical chemist in the School of Mines, Columbia College, in addition to other valuable testimony, said of the use of nitric acid: "It will form with almost all organic tissues and substances, nitro compounds, and also oxygen compounds and nitrogen. It will need to be treated with great care to remove it from the lard, and will depend a great deal upon the proportion of nitric acid used. If nitro compounds, with the fats, are formed. I have my doubts as to whether the acid could be removed. I think it could not be removed by washing. If the fat were immersed in a bath of ice-water twenty-four hours, it might remove it, but I don't think it would. There will be a certain amount of nitric acid left, provided the water got a chance to penetrate every portion of the fat. But the fat, not being of such a nature that it would mix with water or allow water to penetrate it, might retain a great deal more acid. Nitric acid, when taken into the stomach in any considerable quantity, has no antidote."

Your committee, therefore, while not averring that oleomargarine is necessarily always unwholesome, believes that it is very likely to be so, and, to a large extent, would necessarily be injurious if used by children or persons in delicate health, and is not in any sense, or can be, a wholesome substitute for pure and natural butter.

THE REMEDY.

The important question to be determined is the remedy to cure the evils complained of. After a careful examination, your committee has come to the conclusion that the evil can only be effectually dealt with by the total prohibition (after a given time) of its manufacture and sale within the State. The laws already upon the statute books have been prepared with great particularity and care, to prevent its sale under the guise of natural butter. Six different enactments for this purpose have already been adopted, but they are evaded and unobserved, and scarcely an attempt is made for their enforcement. The manufacturers, it is true, claim to mark their packages as the statute requires. In some cases, they do mark them; in others they do not; and when so marked, it is often done in skeleton letters, or in forms so blind and misleading as to be unintelligible to the passer-by. But it is with the saloon and boarding-house keeper and retail dealer that the law is practically inoperative and of no avail, and with them there is no method of dealing without resorting to a system of espionage and petty detectives, at war with public policy and with the theory of our Government. Far better restrain with a strong hand the first inception and sale of this fraudulent article than to send prying detectives to the kitchens and dining-rooms of citizens. The power to prohibit is unquestioned. A great wrong is being committed and a monstrous fraud affecting the public in its daily life and ruining much of the valuable property of the State. When the fraud can be checked in no other way, all parties not directly interested concede the justice and propriety of stamping out the evil by legislative prohibition. The law of self preservation will justify the citizens of this State in protecting themselves and property against the inroads of a fraudulent commodity mostly prepared and brought within our borders from other States. "The living cow cannot compete with the dead hog," and the farmers of this State must either submit to the gradual but certain impairment and destruction of the value of their farms and the profits therefrom, or prevent, by legal enactment, the manufacture and sale of this spurious article, productive only of wrong and injury in its fraudulent and vicious sale. This would have long ago been done but for the error which had obtained that the laws of the State could not prevent the manufacture of an article for which the General Government had granted a patent, or which had not been shown to be poisonous or injurious to the public health.

This delusion has now been dispelled. The Federal court has decided that the State has the power to prohibit the sale of any article within its borders when the public exigency requires it, and this even though the article prohibited is covered by letters-patent from the General Government. Several of the Western States have already prohibited the manufacture and sale of this compound, notably, Ohio and Missouri. The Missouri law is a very sweeping one, and its constitutionality and validity have been tested in both the courts of the State and of the United States. In the State court the decision upheld the law, and, while the case was still pending an appeal, a decision was rendered by the Federal court.

In re Brosnahon, Jr., Circuit Court of Missouri, June, 1883. Reported in the *Federal Reporter*, November, 1883, page 62, before Judges Miller and McCrary, adjudicating the whole question in the most emphatic manner.

Roscoe Conkling was employed as counsel by the oleomargarine manufacturers, and his great talents were vainly exerted to save them. The court put their decision upon the plain ground that it was clearly within the power of the Legislature to prohibit the manufacture and sale of any article when the public good required it. All that a patent from the Federal Government can do is to give a monopoly to the patentee of the article produced, but gives no right to manufacture or sell at all, when the same is in conflict with the laws of the State. Your committee have labored industriously to find a less severe or stringent measure that would meet the needs of the exigency. They have labored in vain and find no remedy save in a prohibiting statute. They feel that the question is a broad and far-reaching one and cannot be evaded or avoided. All parties (the oleomargarine makers included) fully agree that the question is now to be tested whether the dairy interests of our State can longer compete with the genuine and also the adulterated products of the West. The competition with the pure natural butter, produced by the creameries of the West, is already sharp enough, and will tax to the utmost the resources of our farmers. But the competition is a fair one and must be fairly met; but when we add to this the immense production of oils and fats from their countless slaughter-houses, with all the admixtures to which they are subjected, and the fraudulent and counterfeit articles made therefrom, the conclusion is irresistible that our dairy interests are to be destroyed or deeply impaired, or the manufacture and sale of this counterfeit product must be prohibited by the strong arm of the law, and the means provided for its certain and rigid enforcement. Threats were openly made by the agents of the manufacturers that there was not power enough in the State Government to prohibit its manufacture in the city of New York, and there will doubtless be no effort spared by this compact and disciplined organization to thwart both the enactment and enforcement of the law. The argument used to mislead the public judgment and frighten conservative men, that a large amount of capital has been invested in the business, which would be destroyed by a prohibitory enactment, has but little foundation in fact and should have no weight with this Legislature. The capital invested is ridiculously small when compared with the immense production and profit made. There are single farmers who can manufacture in their cellars, with a capital of five hundred dollars, enough of this product to supply a township. Hardly anything used in the manufacture need be destroyed. The fats, oils, and chemicals are commercial products, always selling for what they are worth, while the few inexpensive buildings used for manufacturing are available for other uses. It is in no sense a great industry, and in no true sense a manufacture. Articles already produced and manufactured are mixed together and colored to counterfeit a genuine article, necessary for the life and health of the citizen. The farmers intend to fight the battle out on this line, and will sustain their legislators in doing their duty.

MILK.

The other great dairy product to which your committee has given its attention, viz: the milk-supply to our large cities, has assumed an importance, not only as to the property value of the interest connected with it, but also in relation to the health and comfort of millions of our population who can only be protected from injury by the legislative power of the State. The lust and greed of gain at the present day are so great that in this matter, as in the one above referred to, the judgment and conscience of the dealer and the middleman affords no sufficient protection either to the producer or consumer. The evidence adduced before your committee from the most careful and intelligent witnesses proved that of the five hundred thousand quarts of milk furnished daily to New York city in 1882, nearly two hundred thousand were water or skim-milk added to the pure milk in various forms and proportions; entailing the most alarming consequences to the health and lives of young children, and to the comfort and well-being of the whole community.

By a law recently enacted with stringent penalties, a remedy has been found for nearly one half of this adulteration, so that now but one quarter or one fifth of the milk-supply is water or skim-milk, principally the former. Two practical difficulties, however, still arise in the enforcement of the law according to its spirit for the protection of the producer and consumer. The first and leading defect arises from the fact that the State has no laws fixing a standard for milk or providing for the quantities of fats or solids that pure milk shall contain. While the ordinances of the board of health of New York city fix a standard so ridiculously low that the retailers and middlemen may take nearly one third the cream from the milk and still sell the same as pure milk without being obnoxious to any provision of the said ordinances or liable to any punishment whatever, the *modus operandi* is as follows: The board of health has fixed the minimum amount of the solids to be contained in pure milk at eight per cent. The average amount of solids in pure milk is something over fourteen per cent. The minimum where the milk is taken from poor cows, fed upon poor feed, is not often less than twelve per cent., so the middleman buys the pure milk from the farmers, skims off the cream, or adulterates it with skim-milk or water, so that it shall not contain less than eight per cent., and the product is put out to the consumer as pure milk, and this is the quality of milk sold to-day to a very large proportion of the citizens of New York and Brooklyn, for which they pay from eight to ten cents per quart, while the producer receives from three to four cents during the winter months and from two to three cents during the summer. Your committee propose to amend the law by fixing a standard of twelve per cent. of solids for milk, and by giving the court of special sessions additional power, so as to provide against the vexatious and tedious delay in bringing offenders to justice. Provision should also be made for the appointment of State inspectors, who should have power to examine and inspect the milk-product while in transit to the city, as well as when actually offered for sale. With these amendments, it is believed that the laws can be so enforced as to give almost absolutely pure milk to the consumers and greatly benefit the producers. When it is remembered that nearly three fourths of the infant children in the cities are reared from cow's milk, and that the use of adulterated and skim-milk greatly increases the sickness and mortality among them, the importance of this legislation will be apparent to all. Dr. H. A. Pooler, the president of the Goshen Board of Health, and vice president of the Farmers' Association, examined this subject with great care, and testified before the committee that since the partial enforcement of the present law, (which prevents, in part, the sale of adulterated and skim-milk,) the mortality among children under five years of age in the city of New York has largely decreased. The deaths have been less by over three thousand during the year last passed than during the year preceding, when the adulterations largely prevailed.

Your committee have felt averse to creating new State officials, or to the recommending of additional outlay to enforce these laws and to provide for the protection of consumers and producers alike, but they have found (and the experience of the past is conclusive on this point) that even the best laws will not enforce themselves, and where the selfish interests of powerful combinations of manufacturers and middlemen come in the way, that there is no effectual method of protecting the farming interests save by investing officials specially delegated to enforce these enactments with the necessary powers, and making provision for a fund to meet the expenses incident thereto.

In this case, the committee are of the opinion that these officials should be chosen from and represent the dairy interests of the State.

Your committee have prepared a bill in accordance with the foregoing suggestion, embodying their views upon the questions herein discussed, which accompanies this report and for which they respectfully solicit the approval of the Legislature.

Your committee have received several communications asking it to investigate the adulteration of other food products, but it will await the direction of the Senate as to further investigation.

All of which is respectfully submitted.

March 21, 1884.

H. R. LOW,
E. B. THOMAS,
H. C. NELSON,
Committee on Public Health.

The act presented to the Legislature by the Board of Agriculture was, after amendment, passed finally and became a law by the approval of His Excellency Governor Pattison, May 21, 1885. The law as it stands upon the statute books is as follows:

AN ACT

For the protection of the public health, and to prevent adulteration of dairy products and fraud in the sale thereof.

SECTION 1. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same,* That no person, firm, or corporate body shall manufacture out of any oleaginous substance, or any compound of the same, other than that produced from unadulterated milk, or of cream from the same, any article designed to take the place of butter or cheese produced from pure unadulterated milk or cream from the same, or any imitation or adulterated butter or cheese, nor shall sell, or offer for sale, or have in his, her, or their possession with intent to sell, the same as an article of food.

SECTION 2. Every sale of such article or substance which is prohibited by the first section of this act made after this act shall take effect is hereby declared to be unlawful and void, and no action shall be maintained in any of the courts of this State to recover upon any contract for the sale of any such article or substance.

SECTION 3. Every person, company, firm, or corporate body who shall manufacture, sell, or offer or expose for sale, or have in his, her, or their possession with intent to sell, any substance, the manufacture and sale of which is prohibited by the first section of this act, shall for every such offense forfeit and pay the sum of one hundred dollars, which shall be recoverable, with costs, by any person suing in the name of the Commonwealth, as debts of like amount are by law recoverable, one half of which sum when so recovered shall be paid to the proper county treasurer for the use of the county in which suit is brought, and the other half to the person or persons at whose instance such a suit shall or may be commenced and prosecuted to recovery.

SECTION 4. Every person who violates the provisions of the first section of this act shall be deemed guilty of a misdemeanor, and upon conviction shall be punished by a fine of not less than one hundred dollars nor more than three hundred, or by imprisonment in the county jail for not less than ten nor more than thirty days, or both such fine and imprisonment for the first offense, and by imprisonment for one year for every subsequent offense.

SECTION 5. It shall be the duty of constables of the several cities, boroughs, wards, and townships of this Commonwealth to make quarterly reports, under oath, to the courts of quarter sessions, of all violations of any of the provisions of this act, which may come or be brought to their notice, and it shall be the duty of the judges of the said courts to see that the said returns are made regularly and faithfully.

SECTION 6. This act shall take effect on the first day of July, one thousand eight hundred and eighty-five.

SECTION 7. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

In order to test the constitutionality of this act, an action was commenced in the court of Dauphin county against a butter-dealer for selling oleomargarine contrary to the act of 1885. The defendant having been convicted, motion was made for a new trial and an arrest of judgment. In answer to this motion, Judge J. W. Simonton delivered an opinion as follows:

The defendant, who is engaged in the grocery and provision business in the city of Harrisburg, was tried in the court of quarter sessions of Dauphin county, on an indictment based upon the act of May 21, 1885, the first section of which is as follows: "No person, firm, or corporate body shall manufacture out of any oleaginous substance, or any compound of the same, other than that produced from unadulterated milk or of cream from the same, any article designed to take the place of butter or cheese produced from pure unadulterated milk or cream from the same, or (of) any imitation or adulterated butter or cheese, nor sell or offer for sale, or have in his possession with intent to sell the same as an article of food." The fourth section makes it a criminal misdemeanor to violate the provisions of the first section.

The offense charged was the selling, and having in possession with intent to sell, the article the manufacture and sale of which is prohibited by the act.

The following agreement was, at the trial, put in evidence by the Commonwealth: "It is agreed, for the purposes of this trial, that the defendant

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NOTE.—The fact that this act was largely the work of the Board of Agriculture and that its passage was urged by the Board is, perhaps, sufficient reason for the insertion of Judge Simonton's opinion here. Aside from this it will be found to contain much that is of interest to the dairymen of our State.

sold to the prosecuting witness, in the city of Harrisburg, July 10, 1885, as an article of food, two packages, *pro ut,* the said packages here produced in court, containing an article manufactured out of an oleaginous substance and compound other than that produced from unadulterated milk or cream from the same, and designed to take the place of butter produced from pure unadulterated milk or cream; that said packages were sold and bought as butterine, and not as butter produced from pure unadulterated milk or cream produced from the same.

"It is further agreed that said defendant had in his possession, with intent to sell the same as an article of food, one hundred other pounds of said article.

"It is further agreed that the packages so sold to the prosecutor, and as now produced in court, contain twenty-three pounds each, and that each package was then, and is now, marked with the words, 'oleomargarine butter,' upon the lid and side of the package in a straight line in Roman letters half an inch long." Whereupon the Commonwealth rested.

The defendant then produced an expert witness, and offered to prove by him certain matters, which, on objection by the district attorney, were excluded by the court. These offers will be quoted at length hereafter in this opinion.

The case was then submitted to the jury on the admission contained in the agreement in evidence, and a verdict of guilty was rendered.

Motions were then made, on behalf of defendant, for a new trial and an arrest of judgment, which were fully and ably argued and are now to be decided. The able counsel for the defendant contended at the trial and on the argument for these motions:

First. That the act under which defendant was indicted and convicted is unconstitutional *per se;* and

Second. That the evidence offered and rejected was relevant to the question of its constitutionality as applied to the special facts of this case.

We must determine whether either or both of these positions can be maintained. It results, from the very nature of the case, that, when the question properly arises and a statute is found by the courts to be unconstitutional, they must declare it void. The Constitution of the United States is the supreme law of the land, and next to it and higher in authority than legislative statutes is the Constitution of the State. Hence, when a statute comes in conflict with either, it must give way, and the courts must decide whether such conflict exists or not, when the rights of parties litigant depend upon such decision.

"Courts are organized and established to administer the laws of the land. In their decisions they are bound to preserve and protect those paramount laws which they are sworn to support." *Flint River Steamboat Company* vs. *Foster, 5 Ga., 194, (48 Am. Dec., p. 256.)* But, as is shown by Chief Justice Black in *Sharpless* vs. *The Mayor, 9 H., 147,* a statute will be declared void by the court "only when it violates the Constitution clearly, palpably, plainly, and in such manner as to leave no doubt or hesitation in our minds," and he adds that this is a rule which "has the singular advantage of not being opposed even by a *dictum.*" Again, in *Erie and Northeast Railroad Company* vs. *Casey, 26 Pa. St., 287,* the same judge says: "The right of the judiciary to declare a statute void and to arrest its execution is one which, in the opinion of all courts, is coupled with responsibilities so grave that it is never to be exercised except in very clear cases; one department of the Government is bound to presume that another has acted rightly. The party who wishes us to pronounce a law unconstitutional takes upon himself the burden of proving beyond a doubt that it is so." And, in the opinion of the court in *Pennsylvania Railroad Company* vs. *Riblet, 66 Pa. St., 164*, Chief Justice Sharswood says: "Nothing but a clear violation of the Constitution—a clear usurpation of power prohibited—will justify the judicial department in pronouncing an act of the legislative department unconstitutional and void." And the courts cannot inquire whether the Legislature has violated the general principles of liberty, or whether its enactments are unwise or inexpedient, but only whether it has overstepped the limits prescribed for it in the Constitution.

This is declared by Chief Justice Black, in the clearest and most forcible language, in *Sharpless* vs. *The Mayor*, *supra*, thus: "To me, it is as plain that the General Assembly may exercise all the powers which are properly legislative, and which are not taken away by our own or by the Federal Constitution, as it is that the people have all the rights which are expressly reserved. We are urged, however, to go further than this, and to hold that a law, though not prohibited, is void if it violates the spirit of our institutions, or impairs any of those rights which it is the object of a free government to protect, and to declare it unconstitutional if it be wrong and unjust. But we cannot do this." And he proceeds to show, by reference to numerous authorities, that, as he says, "the weight of authority is overwhelming" in support of the doctrine thus laid down. And, in the later case of *Commonwealth* vs. *Maxwell, 3 Casey, 456*, Chief Justice Woodward said: "A law that is unconstitutional is so because it is either an assumption of power not legislative in its nature, or because it is inconsistent with some provision of the Federal or State Constitution."

We could cite numerous cases to show that the same doctrine is held by the highest courts of all the States, but we do not deem it necessary to do so. We have abundantly shown that it is the doctrine by which we must be governed in deciding this case. We will endeavor, first, to determine whether the act is unconstitutional *per se*, irrespective of the evidence offered or excluded. The burden of the proof is, as we have seen, on the defendant. We have carefully considered the suggestions and arguments advanced by his able counsel intended to show that the power to enact a statute such as the one in question, which, as they contend, deprives the defendant of the use of his faculties and takes from him a means of livelihood, is excepted out of the general grant of the legislative power contained in the Constitution by the express or implied limitations or prohibitions of the bill of rights or the body of the Constitution itself.

But assuming for the present that the statute is in its nature legislative, we are wholly unable to find any limitation or prohibition which can be successfully pleaded against its enactment or enforcement. For whilst the bill of rights does declare that "all men are born equally free and independent, and have certain inherent and indefeasible rights, among which are those of enjoying life and liberty, and of acquiring, possessing, and protecting property and reputation, and of pursuing their own happiness," this has never been construed to be a declaration that these rights are absolute.

On the contrary, as is said by Chief Justice Shaw, in *Commonwealth* vs. *Alger, Cushing, 53*: "We think it a settled principle growing out of the nature of well-ordered civil society that every holder of property, however absolute and unqualified his title may be, holds it under the implied liability that his use of it shall not be injurious to the equal enjoyment of others having an equal right to the enjoyment of their property, nor injurious to the rights of the community. All property * * * is held subject to those general regulations which are necessary to the common good and general welfare. Rights of property, like all other social and conversational rights, are subject to such reasonable limitations in their enjoyment as shall prevent them from being injurious, and to such reasonable restraints and regulations established by law as the Legislature, under the governing and controlling power vested in them by the Constitution, may think necessary and expedient."

Hence, if the act in question be legislative in its character, the limitations which it prescribes for the defendant in the acquisition, possession, and use of his property are clearly within the boundary lines drawn by the Constitution, if, in the judgment of the Legislature, these limitations are considered necessary and expedient for the welfare of the community. And if so, then, in so far as they do, if at all, interfere with the defendant's full enjoyment of his property, this interference results from the "law of the land."

It has not been even suggested in argument that this statute is in conflict with any of the provisions of the Constitution of the United States, and hence we need not refer to that instrument, except to say that, if it were so suggested, we think the contrary is clearly shown by Mr. Justice Miller, *in re Brosuakan, 18 Fed. Rep., 62.*

But counsel contend that this enactment is not properly legislative in its character, but that, under the guise of a pretended exercise of the police power of the State, the Legislature has made an unwarranted attack upon private rights; that, as stated by the learned counsel who closed the argument on behalf of the defendant, "in the form of government ordained by this people and under which we live, the grant of legislative power never included a power for the destruction of a harmless industry, which is sought in this case to be exerted."

This brings us to the fundamental question in the case, namely, the question of the nature and extent of the police power of the State.

This power is a proper subject for description rather than definition, and it has nowhere been more aptly described than by Chief Justice Shaw in *Commonwealth* vs. *Alger*, *supra*, at page 85, where it is said to be "the power vested in the Legislature by the Constitution, to make, ordain, and establish all manner of wholesome and reasonable laws, statutes, and ordinances, either with penalties or without, not repugnant to the Constitution, as they shall judge to be for the good and welfare of the Commonwealth, and of the people of the same."

This power, as was said by Mr. Justice Field, in his concurring opinion in *Bartemeyer* vs. *Iowa*, *18 Wall.*, *138*, extends to "all regulations affecting the health, good order, morals, peace, and safety of society, and under it all sorts of restrictions and burdens are imposed, and when these are not in conflict with any constitutional prohibition or fundamental principles, they cannot be successfully assailed in a judicial tribunal."

We think the line between the valid exercise of this police power and the invasion of private rights is well drawn in the opinion of the court by Earl, J., in *Jacobs' case*, *98 N. Y.*, *98*, thus: "Generally it is for the Legislature to determine what laws and regulations are needed to protect the public health and secure the public comfort and safety, and when its measures are calculated, intended, convenient, and appropriate to accomplish these ends, the exercise of its discretion is not subject to review by the courts. But they must have some relation to these ends. Under the mere guise of police regulations, personal rights and private property cannot be arbitrarily invaded, and the determination of the Legislature is not final and conclusive. If it passes an act ostensibly for the public health, and thereby destroys or takes away the property of a citizen and interferes with his personal liberty, then it is for the courts to scrutinize the act and see whether it really relates to and is convenient and appropriate to promote the public health. It matters not that the Legislature may, in the title to the act, or in its body, declare that it is intended for the improvement of the public health. Such a declaration does not conclude the courts, and they must yet determine the fact declared and enforce the supreme law."

To the same effect is *Commonwealth* vs. *Bearse, 132 Mass., 542*, where, speaking of the exercise of the police power, it is said: "The Legislature is largely the judge of its own powers with reference to these matters. If it can be seen, indeed, that the rights of property are invaded under the pretense of a police regulation, it would be our duty to interfere to protect them." And in *Pennsylvania Railroad Company* vs. *Riblet, supra*, the court say: "We cannot try the constitutionality of a legislative act by the motives and designs of the lawmakers, however plainly expressed. If the act itself is within the scope of their authority, it must stand, and we are bound to make it stand if it will upon any intendment." The point of contact between the power of the Legislature and that of the courts, with respect to the exercise of the police power, may be illustrated by the decisions relating to the power of taxation. This power, when exercised in the mode prescribed by the Constitution, is practically unlimited, but the courts will always determine whether a so-styled taxing act is, in reality, such, and if it be not, as, for instance, if the purpose for which the tax is laid be a private and not a public purpose, the act will be declared unconstitutional and void. This is the principle lying at the foundation of the decisions of the numerous cases which hold that taxation in aid of the construction of railroads is constitutional, among which *Sharpless* vs. *The Mayor, supra*, is a leading case. The taxation is upheld because the building of railroads is deemed a matter of public interest. And whenever the courts have considered that the construction of railroads is not a public matter, they have held that laws authorizing taxation for such a purpose are not in reality tax laws, an instance of which is *People* vs. *Salem, 20 Mich., 452*, decided by Mr. Justice Cooley. See note to *Sharpless* vs. *Mayor, 59, Am. Dec., 782*, citing a multitude of cases. See, also, cases relating to frontage rule of valuation of real estate, for assessment purposes: *Washington Avenue, 19 P. F. S., 352; Seely* vs. *City of Pittsburgh, 1 Norris, 360; Craig* vs. *City of Philadelphia, 8 Norris, 265; City of Philadelphia* vs. *Rule, 12 Norris, 15.*

Another illustration is furnished by the cases relating to the exercise by the Legislature of the power of eminent domain. The Legislature may condemn, or authorize the condemnation of, private property for public use, and it may, in the exercise of its discretion, determine when and upon what property the power of eminent domain may be exercised; but its exercise is not beyond the reach of judicial inquiry. Whether or not a use is a public one, which will justify the exercise of the power, is a judicial question. Although the Legislature may declare it to be public, that does not necessarily determine its character; it must in fact be public, and if it be not so, no legislative act can make it so. *Palairet's Appeal, 17 P. F. S., 438.*

On these principles, the court of appeals of New York, in Jacobs' case, *supra*, decided the statute there in question to be unconstitutional. It was entitled "An act to improve the public health by prohibiting the manufacture of cigars and preparations of tobacco in any room in tenement houses in certain cases, and regulating the use of tenement houses in certain cases." It prohibited such manufacture in any tenement house occupied by more than three families, except on the first floor of houses on which there is a store for the sale of cigars and tobacco. The court, on examining the nature and scope of the act, say: "It is plain that this is *not* a health law, and that it has no relation whatever to the public health;" and therefore it is pronounced unconstitutional. Had it been, in reality, a health law, the decision would have been otherwise. So, in *People* vs. *Marx*, *1 East. Rep.*, *196* (*32 Abb.*, *L. J.*, *6*), where the defendant was indicted for a sale made in violation of the provisions of an act entitled "An act to prevent deception in the sale of dairy products," the body of which is substantially the same as that of the act now before us, the court held the act unconstitutional because they found that it was not a *bona fide* police regulation. They say: "It appears to us quite clear that the object and effect of the enactment under consideration was not to supplement the existing provisions against fraud and deception by means of imitation of dairy butter, but to take a further and bolder step, and by absolutely prohibiting the manufacture and sale of any article which could be used as a substitute for it, however openly and fairly the character of the substitute might be averred and published, to drive the substituted articles from the market and protect those engaged in the manufacture of dairy products against the competition of cheaper substances capable of being applied to the same uses as articles of food."

The learned counsel for the respondent frankly meets this view, and claims in his points, as he did orally upon the argument, that even if it were certain that the sole object of the enactment was to protect the dairy industry in this State against the substitution of a cheaper article made from cheaper materials, this would not be beyond the power of the Legislature. *This, we think, is the real question presented in the case.*"

And, after referring to constitutional provisions and cases, the court adds: "Who will have the temerity to say that these constitutional principles are not violated by an enactment which absolutely prohibits an important branch of industry, for the sole reason that it competes with another, and may reduce the price of an article of food for the human race?"

"Illustrations might be indefinitely multiplied of the evils which would result from legislation which should exclude one class of citizens from industries, lawful in other respects, in order to protect another class against competition. We cannot doubt that such legislation is violation of the letter as well as the spirit of the constitutional provisions before referred to, nor that such is the character of the enactment under which the appellant was convicted."

This decision is manifestly correct, if we concede that the purpose and intent of the act were those thus found and declared by the court.

And if we could be satisfied that the object and intent of the act in question here were what the court of appeals of New York declared the object and intent of the act before that court to be, we would not hesitate to pronounce it unconstitutional and void. But having in mind the axiom that all the presumptions are in favor of the good faith of a coördinate department of the Government, and that to doubt is to be resolved in favor of the validity of its acts, how can we say that it is not the *bona fide* purpose of this statute, as expressed in its title, to protect the public health, and to prevent the adulteration of dairy products and fraud in their sale? And the Legislature having, by passing the act, declared its judgment that the means used are necessary to attain these ends, we cannot review this judgment, when exercised in good faith, for the conclusive reason that it is clearly within the jurisdiction of the Legislature to effect these purposes by appropriate means. "The fair presumption is that, in the honest judgment of the law-making power, exercised in the light of past legislation on the same subject, no less stringent enactment would have sufficed."

In accord with this view is the *State* vs. *Addington, 12 Mo. App., Rep., 214*, affirmed in *77 Mo. R., 110.* There a statute substantially identical with ours was held to be a valid exercise of the police power of the State vested in the Legislature. This ruling was based upon the conclusion that the statute "was obviously passed in the form of a sweeping prohibition, because the Legislature were of opinion, after two years' experience with the previous statute, that it was ineffectual to prevent our people from being defrauded by having an artificial compound sold to them as real butter. The design of the manufacturer and seller may be perfectly honest, but the person to whom they may sell the article"—the retail dealer—"may be dishonest; and therefore the Legislature thought it best to lay the axe at the root of the tree, by prohibiting entirely the manufacture and sale of such compound within the State."

The opinion delivered in this case in the intermediate court by Thompson, J., is worthy of attentive perusal, by reason of its strength of reasoning and fullness of illustration and citation of authorities. We must content ourselves with a reference to a few only of the multitude of cases, in addition to those already cited, which illustrate and confirm the principles we have stated and the conclusion we have reached. They are as follows: *Slaughter House Cases, 16 Wall., 36;* where the court hold that "An act to protect the health of the city of New Orleans," &c., which gave to a corporation the exclusive right to have all stock intended for slaughter landed at its stock-yard, and butchered at its slaughter-house, was constitutional, because it was passed in the exercise of the police power of the State.

Butchers' Union Company vs. *Crescent City Company, 112 U. S., 746*, deciding that although the act upheld in the slaughter-house case, just cited, gave the corporation an exclusive right for twenty-five years, by a valid contract, yet, in the exercise of the police power, the privilege of landing stock and maintaining a slaughter-house might, within that period, be granted also to another company. And see cases referred to in the opinion to show that the Legislature cannot, by contract, divest itself of the right to exercise the police power where deemed necessary. *Beer Company* vs. *Massachusetts, 97 U. S., 25;* in which it is decided, affirming *Bartemeyer* vs. *Iowa, 18 Wall., 129*, that a State law prohibiting the manufacture and sale of intoxicating liquors is not repugnant to any clause of the Constitution of the United States, and that, if the public safety or the public morals require the discontinuance of any manufacture or traffic, the Legislature, in the exercise of the police power, may require its discontinuance, even as against a corporation chartered for the express purpose of carrying it on.

Patterson vs. *Kentucky, 99 U. S., 501*, where the same principle is applied to an act forbidding the sale of an article for which a patent had been granted by the United States. *Stone* vs. *Mississippi, 101 U. S., 814*, where the same principle was applied to the charter of a lottery company. *Barber* vs. *Connelly, 113 U. S., 27;* and *Soon Hing* vs. *Crowley, ib., 703:* which hold that a municipal ordinance prohibiting washing and ironing in public laundries and wash-houses within certain hours is a valid exercise of the police power.

In the latter case, it is said: "The courts cannot inquire into the motive of the Legislature in passing an act, except as they may be disclosed on its face, or inferrible from its operation, considered with reference to the condition of the country and existing legislation."

Blair vs. *Forehand, 100 Mass., 136*, holding that an act providing that any person might kill any dog not licensed and collared, as provided by the statute, whenever found, was a valid exercise of the police power. *Bertholf* vs. *O'Rielly, 74 N. Y., 509*, (*30 Am. R., 323*,) deciding after a full discussion of the extent of the police power, that a statute enacting that the lessor of premises, with the knowledge that they are to be used for the sale of intoxicating liquors, shall be liable for damage caused by the act of one intoxicated by liquor sold there, is constitutional.

Woods vs. *State, 36 Ark., 36*, (*38 Am. R*, *22*,) holding that under the statute forbidding the sale of ardent spirits by any person, for any purpose, without a license, a druggist cannot lawfully sell such spirits, even as medicine, upon the prescription of a physician—citing numerous cases to show that the right of the Legislature in the exercise of the police power of the State to regulate or prohibit the sale of intoxicating liquors has been settled by the courts beyond controversy.

State vs. *Mugler, 29 Kan., 252*, (*44 Am. R., 643*,) which holds that a law prohibiting the brewing and selling of beer, applied to beer lawfully manufactured before the law took effect but sold thereafter.

Davis vs. *State, 68 Ala., 58*, (*44 Am. R., 128*,) where it is decided that a statute declaring it unlawful, within certain counties, to transport or move, after sunset and before sunrise, any cotton in the seed was constitutional.

Donnelly vs. *Decker, 58 Wis., 461*, (*46 Am. R., 637*,) in which the court held that a law providing for the drainage of lands whenever the town supervisors shall deem it conducive to public health, and for the payment of damages, and for the assessment of the whole cost on the lands benefited, was constitutional as an exercise of the police power.

Hawthorne vs. *People, 109 Ill., 302*, (*50 Am. R., 610*,) deciding that a law requiring operators of butter and cheese factories on the coöperative plan, to give bonds for faithful accounting for property received for manufacture, is not unconstitutional.

Fry vs. *State, 63 Ind., 552*, (*30 Am. R., 238*,) holding constitutional a statute regulating the issue and sale of tickets by railroad companies.

State vs. *Ah Chew, 16 Rev., 50*, (*40 Am. R*, *488*,) sustaining statute prohibiting the sale of opium.

Commonwealth vs. *Waite, 11 Allen, 264.* This case decides that the Legislature have the right, in the exercise of the police power, to make it a criminal offense to sell pure milk mixed with pure water.

Many of these cases, which are but a tithe of those pertinent to the subject, which might be cited, are fully and ably reasoned, and are supported by the citation of numerous authorities; taken together, they furnish a very instructive discussion and illustration of the nature, extent, and limitation of the police power of the State, and its relations to the Federal and State Constitutions.

Thus far we have considered the case as if the question were merely whether the statute is or is not constitutional, *per se*.

But the defendant offered to prove at the trial, by an expert witness, "that he saw the article sold to the prosecuting witness manufactured; that it was made from pure animal fats; that the process of manufacture was clean and wholesome; that the article contains the same elements as dairy butter; that the only difference between them is that the manufactured article contains a smaller proportion of the fatty substance known as butterine; that this butterine exists in dairy butter in the proportion of from three to seven per cent., and in the manufactured article in a smaller proportion, and was increased in the manufactured article by the introduction of milk and cream; that, this having been done, the article contains all the elements of butter produced from the pure unadulterated milk, or cream from the same, except that the percentage of butterine is slightly smaller; that the only effect of butterine is to give flavor to the butter, and it has nothing to do with its wholesomeness; that the oleaginous substances in the manufactured article are substantially identical with those produced from milk or cream; that the article sold by defendant to the prosecuting witness was a wholesome and nutritious article of food, and in all respects as wholesome and healthful as butter produced from pure unadulterated milk or cream."

This for the purpose of showing that "the statue is unconstitutional, and not a lawful exercise of the police power."

Defendant further offered to prove "that he is engaged in the grocery and provision business in the city of Harrisburg, and that the article sold by him was part of a large and valuable quantity manufactured prior to the date of the passage of the statute, in accordance with the laws of this Commonwealth relative to the manufacture and sale of said article, and so sold by him; and that, for the manufacture of said article, large investments were made in the purchase of suitable real estate, the erection of proper buildings, and the purchase of the necessary machinery and implements; that, in his traffic in the said article, the defendant made large profits, and that if the said defendant should be prevented from trafficking in said article, the value of his property engaged therein would be entirely lost, and he would be deprived of the means of livelihood." This for the purpose of showing "that the act is void because it deprived the defendant of the lawful use of his property, liberties, and faculties, and destroys his property without making compensation."

On objection by the district attorney that the testimony recited in these offers was irrelevant and immaterial, it was excluded by the court. If there was error in this, defendant is entitled to a new trial.

But we are unable to see how the admission of this testimony could have legally changed the result.

With respect to the first offer, we are by no means prepared to say, even, that an offer to show that oleomargarine butter or butterine is made, generally, from pure animal fats by a pure and wholesome process, and is as wholesome and nutritious an article of food as genuine butter, would have been relevant. But this we are not now called upon to decide. The offer made was to show, merely, that the article admitted to have been sold in this case was such. No one doubts that it might be made as stated in the offer. But it is no less certain that it may be made out of oleaginous substances and compounds that are neither pure nor wholesome. How, then, could evidence that the substance sold in any given case, and admitted to be that prescribed by the act, was pure and wholesome, tend to show that the statute which forbids all sales is unconstitutional? As well might a defendant on trial for selling spirituous liquors in a jurisdiction where all such sales were prohibited, while admitting that he had sold the prohibited article, offer to prove, by way of defense, that the particular glass of liquor sold was pure and wholesome. Witnesses could be called in almost every case who would be willing so to testify, but no court would admit such testimony for the purpose of showing that a prohibitory statute was unconstitutional.

Indeed, the question of the constitutionality of a statute cannot be determined on the testimony of witnesses, for the very conclusive reason that it is a question of law and not of fact, and must be decided by the court on quite other grounds than those of the opinions and beliefs of witnesses. We are satisfied it was not error to refuse the testimony recited in the first offer.

We may here remark that this offer brings into view one of the reasons that impelled the Legislature to pass this act. It states that the amount of butterine in the manufactured article was increased by the introduction of milk and cream, and that the only effect of butterine is to give flavor to the butter.

Manifestly the purpose was to give this article as nearly as possible the flavor and semblance of butter, so that it might be sold as such by the retailer without detection, and no doubt this is the "fraud in the sale" which the act was designed to prevent.

We adopt, on this point, and apply to the statute now in question the language of the Supreme Court of Missouri, in *State* vs. *Addington, 77 Mo. 110:*

"The central idea of the statute before us seems very manifest; it was, in our opinion, the prevention of facilities for selling or manufacturing a spurious article of butter, resembling the genuine article so closely in its external appearance as to render it easy to deceive purchasers into buying that which they would not buy but for the deception. The history of legislation on this subject, as well as the phraseology of the act itself, very strongly tends to confirm this view. If this was the purpose of the enactment, we discover nothing in its provisions which enables us, in the light of the authorities, to say that the Legislature, when passing the act, exceeded the power confided to that department of the Government. And unless we can say this, we cannot hold the act as being anything less than valid."

As to the second offer, it is to be observed that defendant did not propose to prove that the article was manufactured by him, nor that he purchased it, or owned it, prior to May 21, the date of the passage of the act, nor even prior to July 1, when it went into effect. Therefore, as was said of a like offer, by Mr. Justice Bradley in his concurring opinion in *Bartemeyer* vs. *Iowa, 18 Wall., 129,* on page 136*:* "The law was not in this case an invasion of property existing"—in the defendant—"at the date of its passage, and the question of depriving a person of property without due process of law does not arise. No one has ever doubted that he Legislature may prohibit the vending of articles deemed injurious to the safety of society, provided it does not interfere with vested rights of property.

The motions for a new trial and an arrest of judgment are overruled, and the district attorney is at liberty to move for judgment upon the verdict.

THE HORSE AND HIS TREATMENT.

By Dr. ELLWOOD HARVEY, *Member from Delaware.*

MR. PRESIDENT AND LADIES AND GENTLEMEN: The horse is a necessity to all civilization, and is in use wherever civilization exists.

When and where the horse was first tamed and used by man, is not recorded in history. We find in the Bible reference to the use of asses—inferior members of the equine family—among the children of Israel long before the horse is first mentioned, which was during their sojourn in Egypt.

In the history of Abraham, there is frequent mention of the ass as a saddle beast, of the camel as a beast of burden, of sheep, and of oxen, but the name of the horse does not occur until the days of Joseph.

It is probable that horses were indigenous in Africa or the southern part of Asia, when they were in danger from, and in constant fear of, wild beasts, such as lions and tigers. To this day, they inherit the same instinctive dread of these, their ancient enemies, and on smelling lions and tigers in cages, will sometimes become exceedingly alarmed, though neither they nor any of their ancestors for thousands of years have ever been attacked by them. They manifest a sudden fright on seeing anything on the ground that looks like a couching wild beast of prey.

But their origin and the time of their first domestication are of less consequence to us than their present usefulness.

I have alluded to their intimate relation to civilization, and sincerely believe that if horses had not existed on the earth, civilization would have been limited to but a few and narrowly circumscribed localities. Such a civilization, surrounded by a world of barbarism, would have been but rudimentary in character and liable to frequent obliterations. In speaking of civilization as an accomplished fact, I would like to be understood as seriously doubting that any part of the earth yet contains a population that is half civilized. When the lessons of the Great Teacher, the doctrine that all the evil of the world is to be overcome by the good of the world; that we are to overcome evil-doers by doing good to them in return; that the sins and vices of men must be obliterated by the forgiveness, pity, and love of their fellow-men; when these divine principles are recognized in legislation, and in the daily lives of the people of any country, then a true civilization has just begun, and never can begin until then.

But accepting the generally acknowledged definition of civilization, which is more of an intellectual enlightenment than a moral reformation, and is still on the same old barbarian plane of thought and action, with its social jealousies, its scuffling, and intriguing for political distinction and power, its wars, its resentments, and its retaliations, and all that go to make up what is called civilization, and we find its history to be as follows:

On peninsulas and islands where people were crowded together by surrounding seas, or by mountains or deserts, there the free intercourse of mind with mind developed new ideas; as in Hindoostan, with her surrounding seas and mountains; in Egypt, with a sea on one side and a desert on the other, with than wonderful river, the Nile, running its whole length, and affording freedom of communication to her people; in the peninsulas and islands of Greece, and on the peninsula of modern Italy, the seat of ancient Rome, where was developed that immense national power that overran all surrounding countries—in these places the people were crowded near together. Mind sharpened mind, and the various thoughts and knowledge of individuals became the common property of the community. Over that vast expanse of plains, which is the physical feature of northern Europe, the people were in scattered and wandering tribes, without any new influences from age to age to modify their intellectual or social condition into any form of development. In America, rudimentary forms of civilization existed in Yucatan, a peninsula; and in Peru, with a mountain on one side and a sea on the other, where the people were crowded together with increased freedom of personal intercourse. When our race had developed to a certain point under these favoring conditions, some means of locomotion greater than that with which nature had endowed the human body became an absolute necessity to any further advancement. At this point, the horse supplied the want as no other animal on the earth could have done. The docility with which he learns and obeys his master's will, the courage with which he bears him into battle, the endurance with which he drags the stage-coach over ill-made roads, the speed with which he carries the courier from post to post, the patience with which he complies with all the demands on his strength in agriculture, the ardor with which he participates with his master in the chase and in the race, his affection, his peaceful disposition, his freedom from all resentments, his unresisting compliance with all the demands of his sometimes cruel master; these are all powers, faculties, and graceful adornments of character, such as cannot be found combined in any other animal whatever.

These are the qualities that filled the requirements of an advancing civilization; these the means of increased wealth, comfort, and culture at home, and of enlarged intercourse and interchange of ideas with those abroad.

Think about it and tell me of any other animal inhabiting the earth that might have done as much or more than the horse has done. You can not. It is perfectly safe to challenge you to do it. No other animal could be substituted for the horse. Without horses, perpetual semi-barbarism would seem to have been the highest destiny of man upon the earth. We have seen the verification of this thought in America, where rudimentary civilizations developed in favorable localities, but could have no further growth for want of horses. There were no horses here until brought from Europe.

It was necessary to the attainment of railroads, steamboats, telegraphs, telephones—which have somewhat superseded the employment of horses for rapid conveyance—that the horse should first perform his mission. A certain degree of human progress had to be attained before these things were possible, and they probably never would have been attained without him.

Having performed his important mission as an essential factor in the transition of the human race from the savage to the civilized condition over the vast plains of the earth, where the natural powers of man for locomotion would have left him in the perpetual semi-savagery that is always incident to a scanty and scattered population; and having fulfilled the higher function of aiding more civilized communities to the attainment of the practical results of modern science, it might be supposed that horses would be so greatly superseded as to be of no further utility to man, and would cease to claim his attention or regard.

But there never was a time, since the first horse was ridden bare-back by the man who stole the foal from its dam and tamed and used it, that horses were so highly appreciated as now. They still fill a place in the supply of our daily needs as no other animal that was ever created on the earth could fill.

This much on the first part of our subject—the horse—and now let us consider briefly the remaining part of it—his treatment.

A colt should not be weaned from its dam until able to eat other food sufficiently to nourish it. When taken from the mare, a colt should not be closely kept in a stable in summer or winter. It should have plenty of room for exercise in the sunlight, and fresh air every day that is not stormy. It is best to have two or more together, as they will travel about in company and play together, but a single colt in an inclosure will stay in the corner nearest to some other horses, particularly in winter, and will not get sufficient exercise. If a colt is kept in a dark stable all winter, it will probably come out with sprung knees or cocked ankles, and curbs and other joint injuries are liable to happen when the joints are weak for want of exercise.

The education of a colt may be commenced at the earliest period of its life. It will learn readily and not forget. What is taught thoroughly at a month old will be remembered ever after. It may happen that a colt will be less obedient when it is older than it was when taught, but it has not forgotten anything. There is another fact about them. Just as they inherit an instinctive fear of beasts of prey from their remote ancestors, so they inherit what we may have taught their immediate ancestors. Put a colt in harness, and after the little agitation attending the novelty of his new surroundings has subsided, he will begin at once to reveal the inherited instincts that were acquired by his parents and other ancestors. He will respond to a gentle pull on the rein, and be guided by it. This is not because he is pulled around by the strength of his driver. He will not be guided by a pull on one trace; it is because he inherits from his parents what was taught them. Pull gently on the bit and cluck to him, and he will start like a trained horse. Pull gently on the bit in precisely the same manner and say, "Whoa," and he will stop. How often we hear of colts that go right off, like an old horse, the first time they are put in harness. Do you think they would do so if their parents had not been driven in harness? Would a young zebra or elk do it? Would the lion's cub do it?

In teaching colts, the first thing necessary is to let them know that we can over-power them. This must be done gently and without exciting their fear; not by blows, but by restraint. They will then do anything we teach them to do without resistance. They recognize our superiority and submit. This is because horses are gregarious. All animals that live in herds or flocks keep peace in their communities by the weaker submitting to the stronger, the timid to the more resolute. This may be observed in any herd of cattle, and every boy whose duty it is to bring in the cows from the field knows which is the boss cow and which is the underling. The boss walks straight through the herd, the others getting out of her way. None of them resist her. That has been tried before, and the question of superiority settled. Between her and the underling—which is the weakest of the herd—there are just as many grades of authority as there are cows. Each knows which are above and which are below herself, and the inferior makes no contest with a superior.

This principle applies constantly to the management of horses. We must let them know that we can master them, and they will make no resistance to our authority. They are exceedingly responsive to kind treatment. All gregarious animals are timid, and appreciate a protecting friendship. The beasts and birds of prey are never seen in flocks. They are bold, aggressive, and self-reliant.

Keeping these principles in constant view, we may teach horses most surprising lessons in obedience and in performance. They are not demonstrative of their emotions as some other animals are. They may be greatly attached to each other or to a person, and show but little outward sign of their affection. In the field one horse puts his neck over the back of another that he loves; and they enjoy the caresses of a person they love, particularly if the caresses be by putting the arms around their necks, and fondling them about their heads. Oh, the wretchedness of those poor creatures that serve selfish masters with all their strength and speed, and never get a rewarding caress nor a kind word, but only unfeeling and harsh treatment instead! A few kind words, accompanied by a little fondling with the hand, will make a tired horse forget all the burdens and sorrows of a day of toil, performed for another, and not for himself, in company with a task-master he feared and disliked, and not with his fellows.

There are some points of practical horsemanship of which I wish to speak. The horse should be made comfortable at his work. His harness should fit without galling. His bridle should be long enough to bring the bit down to the angles of his lips—not so short as to draw them up an inch or two above their natural position, as is so frequently the case. The blinds should not touch his eyes, nor his eyelids, either. His head should not be reined uncomfortably high. On a long journey, or in pulling a heavy load, he should not be reined up at all. He is surer-footed when his head is free, and, if he should stumble, he recovers better if he can throw his head down and thereby relieve his fore legs of a part of the weight of his body until they get in place again. It is the same principle as is applied when men jump and throw a stone backward from each hand at the same time. If a horse's neck is tired by tight reining, he is a tired horse, and he has been tired without having accomplished anything to show for it. We have all felt what it is to be tired all over by the torture of tight shoes, and the relief that comes to the whole body with a pair of slippers. He should always have a free head when traveling in the night. He needs then the free use of all his faculties—and so he does in the day time. Do not understand me as meaning that the check rein should never be used at all. It has several uses. A horse can be more easily managed, if he is disposed to be a little too lively, by checking his head up. Horses naturally carry their heads up when excited, and reining them up into that position, excites them. A dull horse may, for a short time, be made much more lively by checking his head up a little while he is going. This effect will not continue long, but, for short drives about a town, with a light weight behind him, there is not much objection to it if the horse is fresh. When a horse is checked up while going, he should be unchecked while standing, that he may rest. The check rein should be easily shortened and lengthened, so that his neck may be relieved without giving him entire control of his head while standing, for he might rub his bridle off or get his foot over the lines if he could put his head low down.

In watering horses on the road, hostlers sometimes put on airs and make a show of doing their work very thoroughly to insure a fee. They sponge the horse's face and mouth over the water-bucket, and then offer him the dirty slops to drink. They allow him to have one or two swallows and then take the bucket away from him, or they slop the water up his nose. They will tell you that this is the way to prevent the water from foundering the horse. A horse will wash his mouth in his water, but he does it after drinking, not before. He can swallow best when his mouth is at, or near, the ground, and wants his bucket of water there when he drinks.

A founder is inflammation of the feet, which may be caused by a chill, and a chill may be caused by a bucket of cold water when the weather, too, is cold. But there is no danger of founder if the horse is blanketed, or if he goes on after drinking and keeps warm by exercise. It is an error to let a heated horse cool off before giving him water. When he has an excess of heat in his body, the cool water brings him to his natural temperature and makes him comfortable; but if he is cool when he gets his cool water, he is in more danger of being chilled.

In driving on the road, a little thought may be profitably used to save the horse from unneccessary fatigue. We may drive a horse forty miles in a day, and keep him fresh to the end by a little attention. He should not be hurried at any time on the journey. He should walk up the hills, and not be started into a trot until he has begun to go down on the other side. Increasing the speed up a grade is a great waste of power. Many people believe that it is easier for a horse to trot up a hill than down. This is absurd. On a gentle declivity the wagon runs with but little pulling, and the horse can jog down with but little effort; but to jog up a hill and pull a weight, requires the expenditure of much more strength. In going up a hill, much may be saved by keeping the wheels in the ruts. On a long journey, a horse should be fed twice between morning and night. He will be thereby strengthened, refreshed, and rested. Graminivorous animals require frequent feeding. The carnivora do best to be gorged about once in two days. Experiments have proved that. They may fast for days before securing their prey, and then they eat ravenously while they have it, to fast again until again successful. But the grass and grain-eating animals have their food for biting it off, and generally eat, when at liberty, nearly half of the time.

A horse should not be started off too fast on a long drive. Go slowly for a few hours, gradually increasing the speed, with occasional short rests on the hills, until he has sweated and dried off again. He is then in his best condition for traveling. A horse may be so driven as to be made very tired in the first hour of his day's journey, and then it is a tired horse all day.

After a day's performance, the horse is justly entitled to a comfortable stable for the night. When unharnessed, he should be well cleaned and rubbed dry if he needs it. He may be immediately fed his grain and hay, and have all the water he wants after it. He should have as much hay in his manger as he can eat when he wants it through the night. His system demands it, and his comfort and happiness are greatly promoted by it. If in a strange stable, he will surely be less lonely if he has all the hay he wants to occupy his attention while awake. He should have a bucketful of water in his trough. His stall should be roomy and well littered, and he should not be tied too short as to interfere with lying comfortably. A box-stall is the right thing, and then no tying is needed.

A narrow stall, with the floor slanting backwards to effect drainage, a foul atmosphere, and the presence of strange horses are not the conditions most favorable to a comfortable night's rest after a long journey, but are what most horses have to submit to.

If men knew how intelligent, and how sensitive to kindness horses are, they would treat them more carefully. A horse in a strange stable is greatly cheered and comforted by a visit or two from his master during the evening, before bed-time. He is looked after by the groom better if a visit from the master is expected, and the master himself will see that everything is right. To the farmer, these things may appear more sentimental than sensible, but we are considering now the horse that has been the servant and companion of a man journeying away from home, and living among strangers; and that will be the servant and companion of the morrow. It will do no man harm to cultivate a proper regard for the rights and feelings of his domestic animals. Such a man is a better parent, husband, neighbor, and friend than the selfish, unsympathetic man.

There are drivers who seem to think of their horses as mere machines, without feelings, without intelligence, and without rights. They harness them carelessly, over-load them, start them off impatiently with their heads checked painfully high, and make them trot up hill and down. The poor animal is thirsty and tired. He is driven past running brooks, over the dusty roads in the hot sunshine, without any other attention than frequent urgings to greater speed. He turns his head to one side and then the other to rest his tired neck, he tosses his head because the saddle galls his back, or the bridle chafes his head, he sees other horses standing in the field in the shade of a tree by the road-side, and would fain join them and rest his weary neck and limbs, and refresh his exhausted energies by eating some of the luscious grass of the field. He touches his toe on a stone that was partly concealed in the dust of the road and stumbles, he immediately receives a fearful snatch of the bit on his sensitive mouth, and a cut of the whip, which is accompanied by a sharp, angry exclamation of impatience from his driver. I do not suppose it would do that man any good to give him a taste of that whip, nor do I believe it would do the horse or me any good, but the temptation to experiment a little in that direction would be very great if a suitable opportunity was offered.

I want to add a few words to what I said about the stables we keep our horses in. They should not only be comfortably wide, but they should also be long enough. In livery stables, and in many others, the stall is much too short, and terminates behind in a sudden drop of an inch or two into a lower place for drainage. No horse can lie comfortably if his body projects back of this, and the result is that he stands on his weary legs all night, while his driver, who has been riding all day, sleeps in a bed. The stall should be at least two feet longer than the horse, measured from the end of the nose as he stands. In getting up, a horse puts his fore legs out before him at full length, and then rises—first his shoulders, and then his rump, and if he has not room enough to get up in this way, he will not lie down.

A tired horse rests by standing where the toes of his fore feet are lower than the heels, if he is at liberty to do so. In the field, a horse prefers to stand with his fore feet lower than his hind feet. These positions take the strain off the suspensory ligaments and the back tendons of his legs. But as horse stalls are usually made, these conditions are exactly reversed, the floor being higher in front and slanting backward. This is to effect drainage. The injury the horses sustain on such plank floors is generally recognized, and many owners of highly valued horses never use plank floors, but substitute other material. They often suppose that it is the fact that the floor is laid with planks that does the injury; inferring that there is something injurious to the horses in plank floors. But it is not the material used, it is the shape of the floor that does the harm.

Well, how can this be remedied? There are two ways to do it. One is to have a space under the horse, of about five feet long and two and a half wide, laid on the joists with well-seasoned white-oak stuff that is as thick as the planking of the floor, and about two inches wide. These nailed on the joists with spaces between them that will admit the end of your little finger make a grate that allows all liquid discharge to flow through into a drain beneath, which may have as much slant as you please to carry it off. This is the plan I invented and have used satisfactorily for fourteen years. My stalls are perfectly cool from one end to the other, and a tired horse can rest in them. There is never any unpleasant odor of decomposing urine in the stable, and the horses lie on clean, dry bedding. The floor behind the horses is always clean and dry, and that part of the stable is a little more spacious than is common, which adds greatly to the comfort and convenience of those who attend the horses and those who visit the stables. I have in my mind another plan that might be tried when the grate is not practicable for want of under drainage. If the floor must be solid and must slant down backward to effect drainage on its surface, that part of it on which the fore feet stand might slant the other way, downward and forward. There is a line behind which all the urine will fall, and before which the fore feet will always stand. Let this be the dividing line. The forward slant should be steeper than the other, to bring the fore feet about level with the hind ones. That much would not be unacceptable to the horse, but is the position he likes to stand in with his front feet. The elevated dividing line would not interfere with the recumbent horse, for he would lie behind it.

I have frequently suggested this plan to horsemen, but none have yet tried it. If some man of great wealth should ever happen to make a stable on that plan, and approve it, it would become popular at once without any wear and tear of brains on the part of his followers; which is a very good way to set a new thing going with those whose brains will not stand much thinking. But the graded stable is the better plan, and might be generally adopted with but little trouble, and with certain satisfaction.

Apart from all considerations of justice to the horse, comfortable stables are profitable to his owner.

Horses generally give out first in their legs and feet. If these have been hammered over the roads all day, or if they have not, they will certainly be better preserved if they are rested at night; but if they are stood upon all night because the stall is too short or too narrow, or the halter strap is too short, and if the floor he stands on hasa back wards lant, we may reasonably expect lameness to soon follow.

We have all noticed how tender the meat and joints of a young, but full-grown, chicken are when cooked, and how tough the same parts of a chicken no larger but a year or two older. The joints of one drop apart on slight forcing; those of the other can hardly be cut apart. A young horse may be full-grown and as swift and strong as an older one, but his muscles and the ligaments that hold the bones together at the joints are like those of a young chicken. They cannot stand much continuous strain upon them without injury. Many young horses are injured by overwork, and their owners never know the cause of the injury.

A horse put to work at three years old is full of spirit and nearly as strong as one of riper age. If allowed to do as much as he is willing and able to, he will be much less able and willing at four years old. This is a well-known fact, and is usually referred to teething. The explanation is that he was overworked the year before. He has lost his spirit, and his ankle joints are a little too large on all his legs. The ligaments lacking strength to bear the strain put upon them become thicker to meet the demand. The joints are a little cheese-shaped. If these warnings are unnoticed or disregarded, and the horse is still kept at steady work before hé is matured, not much more evidence may be manifested of injury, but when he should be in the prime of his capacity, he has been already "used up," to use a common expression, and begins to fail. If he is not an animal of exceptionally good constitution, he will show at six or seven what abuse did for him at three or four. In buying a horse of whose antecedents we are ignorant, it is better to buy a sound one at eight or nine years of age than at six or seven. At about that age his infirmities begin, the results of overwork during the tender period of life. If he is sound at nine years old, he has probably not been injured during colthood and will remain sound. A colt may be used very gently all the time after its second year, without harm, but there is danger in overdoing.

In feeding grains, we find they have different values. None of them seem so well suited for horses used for light work as oats. The difference between it and maize is quite striking in their different effects. A corn-fed horse is strong and fat, and in good condition for heavy work. He will do well in an express-wagon or street-car, but if put to fast work, will blow and sweat and go heavily. He will lack vivacity, but will scare at trifling things along the road and becomes unmanageable. The oat-fed horse is equally strong, but not so fat. His muscles are well developed, and his nervous system well sustained. He goes light and strong and free without so much sweating and blowing, and does not become fractious as corn-fed horses sometimes do. Barley, rye, and wheat are much like corn in their effects. Barley and wheat sometimes cause skin diseases that make horses rub their manes and tails, and give them the scratches at their pastern-joints. Wheat is seldom used except as wheat-bran, which many people consider cooling to a horse's system, but it is not. If coarse bran is fed well wetted, so that the horse will swallow it without chewing, it will act on his bowels by its mechanical irritation, and cause slight purging. This seems to have suggested the idea of its cooling property. But if it is fed dry and is well masticated, as it then will be, it has no cathartic effect, but is a stimulating food and often irritates the kidneys and bladder. Wet bran mixed with whole oats is a dangerous food. The horse swallows it without chewing, and the whole grains of oats cause colic that may end in inflammation of the bowels and in death.

Many horsemen think that what is called "mixed feed" has some especial excellence of quality. It usually consists of cut hay or straw mixed with some kind of meal—often of several kinds—and wet. It is certainly true that horses usually thrive well when thus fed. They get their grain mixed with hay which gives it bulk enough to favor digestion, and if they did not get the hay thus, they would probably not get it all with their grain when they most need it. The stomachs of graminivorous animals need to be pretty well distended to insure good digestion, and horses should have some hay with every feed of grain. For fast work it is best not to have the stomach and bowels too full, but the requirements of good digestion may be met without over-distension. Never forget to give water after every feeding if you wish to comply with the instinctive demands of the animal's system. One of the advantages of mixed feed is that it is wet enough to favor digestion. Many domestic animals suffer for want of water, and no amount of food will make them thrive if they have not all the water they need. The amount needed is expressed by the animal's thirst, and there is no better rule to go by than to allow them all they want when they want it, which is after they have eaten. Their instincts are a safe guide, for if they were not, the whole race of them would have come to an end long ago.

Cattle will not fatten, cows cannot give their full share of milk, and horses cannot perform well if their allowance of water is stinted. People tell us that water dilutes the gastric juice in the stomach, and retards digestion, if taken after eating, and that it washes the food out of the stomach into the intestines, where it cannot be digested. This is all nonsense, as is proved by the fact that animals *want* water after eating dry food. If it was the wrong time, they would not want it then. The truth is, it does not remain in the stomach to dilute the gastric juice, nor does it pass into the bowels to wash the food along with it. It is absorbed from the stomach into the blood, nearly as fast as it is swallowed, through the veins of the stomach. It is wanted in the blood at once, and goes there. It needs no digestion, and does not remain in the stomach. It is not digested food to be absorbed by the lacteal absorbent vessels from the small intestines. It does not go out of the stomach in that direction.

In managing horses, as in everything else, restrain your temper. They oftener do wrong from fear than from any other cause. We have the highest of authority for the statement that he who restrains his anger is greater than he who taketh a city. If the horse is afraid of anything, and is hard to control, it makes matters worse if he is afraid of his driver also. If your horse is alarmed, and becoming unmanageable, talk sensibly to him, and be a gentleman. Tell him in a quiet, gentle manner that nothing will hurt him. Say "Go on, it's all right, nothing will hurt you, go on." Do not hold the lines any tighter than is necessary, but slap him with them lightly, and get his attention and confidence by talking to him in a manner that shows him you are not frightened. If you have always treated him in a manner to deserve his affection and confidence, he will believe you, and do whatever you ask of him. If he has no confidence in you, but expects a whipping and a cursing, his alarm will be increased, and so will your danger. The world is not best governed by violence, and cursing should never be done; except when absolutely necessary. Sometimes a driver becomes enraged because his horse does not understand what is wanted of him. Different people use different language to horses, and a new driver may not be able to make the horse understand.

These may appear to be trifling matters, but the sum total in the life of one man is very considerable, and when that is multiplied by the number of all the fools in the world, the suffering inflicted is immense.

There is one more subject to be mentioned in this connection. The State Board of Agriculture represents the county agriculturrl societies of the State. In the annual exhibitions of these, nearly all of them show horses in trials of speed. The great breeders of this country who supply the markets with horses are not those who have extensive stock farms, with tracks and trainers to test and develop their stock; but they are the farmers of the country who raise a thousand for every one raised on the stock farms. Stock-raising is a profitable industry, the demand for good road horses increases every year, and prices go steadily higher and higher.

There is nothing wrong in owning and driving a fast trotter on the road, and there is nothing wrong in raising and selling one. The farmers want to know where the best stock is to breed to, and they have no other way of finding out, except by the trials of speed, endurance, and docility at the county fairs. From this point of view, there seems to be no objection to these trials, but then it is a fact that most of the people who witness them have no other interest in them than to enjoy the excitement of racing. To this some very excellent people object, because they think it leads the minds of the young people into all the evils of gambling and drinking that sometimes attend horse-racing.

Mr. President, I am very fond of racing. I like to see a well-contested race, particularly if I am interested in some of the horses, or in the particular families of horses they may represent. I like to race on the road, however undignified it may appear to some people, and would rather be beaten than not have a race, but always prefer to give the dust to another rather than take it, unless there is a lady in the race against me, and we have ladies in Delaware county who drive well and enjoy racing. But, Mr. President, no man here or anywhere is more opposed to gambling and drunkenness than I am, but I see no necessary connection between them and legitimate sport.

Young animals skip and play, and young people enjoy sports that some older ones have no enjoyment in. Some people have less relish for such pleasures than others, even in their youth; and some lose it early, while others are blest with the continuance of a chearful spirit and the capacity for enjoyment to the last days of their lives. This happy faculty may be strengthened and perpetuated by national indulgence of it, or it may be repressed and even obliterated by persistent supression of all inclination toward the indulgence of it.

There is no use in differing in feelings about it. Each has a right to choose, and one does not in any way interfere with the other. If some choose the wrong way and are envious of the pleasures that others enjoy, they hurt nobody but themselves, and should be pitied rather than censured. If horse-racing hurts anybody, it is those who never see it, but imagine it to be something different from what it is, and stay away and feel bad over other people's enjoyment. It is to be hoped that such unfortunates find compensating pleasures in other things.

I thank you, ladies and gentlemen, for your patient attention to so long an address.

The subject being open for discussion—

Dr. BARNES. I wish to ask the Doctor a question or two. Did you ever hear of a horse being foundered, no matter how warm he was, if he was driven on after being watered?

Dr. HARVEY. No sir; if prevented from being chilled, he does not founder. He should have his water when he is warm and wants it. He should not be cooled off before drinking, or the additional cooling may chill him. When overheated, the water brings him to a normal temperature. This is different from the current belief and practice, but it is true.

Dr. BARNES. Do you maintain that a horse can drink as much water as he wants, while in a high state of heat?

Dr. HARVEY. Yes, sir; but after drinking, he should be kept warm by exercise or by blanketing.

Dr. BARNES. You spoke of stalls that are too short for horses to lie down and get up in. Cows lie down and get up in just such stalls.

Dr. HARVEY. Cattle do not put their fore legs out at full length in getting up as horses do; they get up on their knees, and require less length of stall.

Mr. ZERR. Some years ago, an old Pittsburgh carpenter said it did not matter what condition of heat a horse was in when watered; if he were driven into water over his hoofs he would not founder.

Dr. HARVEY. Such things are to be decided by observation of facts. I never tried it, and do not know. The founder is inflammation of the feet, and nothing more. There is no other kind of founder, though such things are named and talked about. A copious bleeding in the first stage of the disease will quickly cure it.

Mr. ZERR. How about people drinking when overheated in the harvest field?

Dr. HARVEY. When I used to carry water from the spring at the foot of the Brandywine hills, where I was born, to the men in the harvest fields, they all drank as much as they could swallow, and some of them poured it on their wrists beside—a proceeding I did not approve after tugging a tin-kettleful, barefooted, through the stubble to them.

C. C. MUSSELMAN. I was very much entertained by Mr. Harvey's address until the conclusion. I am very sorry he has a weakness for horse-racing.

Dr. HARVEY. It is a very strong weakness.

C. C. MUSSELMAN. He speaks of it as one of the elements by which civilization is increased. Now, I have just come from the State fair, and I am sorry to say I saw something there that reminded me more of barbarism than of civilization, and that was the horse-racing. They were running horses, and when they were doing their utmost, they were unmercifully lashed. How Dr. Harvey can liken that to civilization, I would like him to explain.

Dr. HARVEY. I think it would have been right for the Mr. Musselman to inform on them and have them punished for cruelty to animals. Any person can do that in this State. I do not approve of it. It is wrong and unnecessary. It is never done in trotting matches. I do not believe they were Delaware county men.

Mr. KELLER. They had some horses there from Media. (Laughter.)

Dr. HARVEY. Delaware county sends their jumping horses from the several fox-hunting clubs of the county, and will probably win most of the prizes in that line. I do not think any of our horsemen are cruel to their horses. The horsemen of Delaware county are gentlemen of intelligence and refinement. On the 14th of this month, the annual races of the Rose Tree Hunt came off. They were all running races, and all riders were the owners of their horses, and gentlemen.

A steeple-chase of about two miles across a fair hunting country was ridden by three members of the Club on their own horses. Dr. Huidekoper, the consulting veterinarian of this Board, and a professor in the veterinary department of the University of Pennsylvania, was one of the contestants; George W. Nill, another, is one of Media's most respected citizens and a man older than I am; J. Howard Lewis, the winner, is a gentleman of over seventy-two years of age, a wealthy manufacturer, a large land-owner, and one of the most gentle and affectionate of men to his horses and to everybody else.

Prof. WILSON. Did the Doctor ever know of a race in which the desire of the rider, of the owner, and of the hundreds of witnesses to push on the horse had any limit, but rather to make the horse go faster than his greatest capacity? And does it not end in great cruelty to horses?

Dr. HARVEY. Fast horses are too valuable to be abused, and their owners take the best of care of them. I saw Jack Stewart trot twenty miles to a wagon in less than one hour. An agent of the Society for the Prevention of Cruelty to Animals was on the ground and inspected him after the performance, but found no cause for interference. The horse was put in fit condition for the great performance, and it did not distress him at all. Goldsmith Maid died a few weeks ago; she was twenty-eight years old and had trotted many hundreds of races very fast. She had three hundred and thirty-two heats to her credit that were trotted in two-thirty or better. She was the fastest trotter in the world, or that ever had been, up to the time of her retirement at twenty years old. She trotted as fast that year as she ever did before, and when she had her first foal a year or two later, she was perfectly sound and without a blemish. And so with Flora Temple, that was equally renowned in her day. She was the first trotter to beat two-twenty, and I saw her, too, with her first foal, at the age of twenty-three; she was perfectly sound and lived to be thirty years old.

Dr. BARNES. The Doctor has told us that he is very fond of horse-racing, and that his horses are just as fond of it as he is. and has given us some illustrations of this. Now, is that the natural inclination of the horses, or is it the result of training? Would they take that turn naturally?

Dr. HARVEY. Perhaps not. Some horses, like some men, are not educated up to that point. (Laughter.)

After some discussion on the subjects of horse-shoeing and colic, in which Mr. Eby, Mr. Smith, and Mr Zerr participated, the discussion closed.

THE DIGESTIVE ORGANS OF POULTRY AND THEIR DISEASES.

By the SECRETARY.

It is not necessary for us to inform the general reader that in their formation, character, action, and arrangement, the digestive organs of our poultry differ from those of any other farm stock, and yet we find that, as a class, those who have the care of them have very little conception, either of the nature of the organs themselves or of the diseases to which they are liable; in some cases we find an indistinct and undefined theory as to the cause and cure of these diseases, but by far the majority of poultry-raisers do not think a sick chicken as worthy of any attempt at cure. The same rules which govern diseases in other stock will hold good with poultry. A cause which produces diarrhœa in one class will probably cause it in the other, and the cure in the one case is safe for our adoption in the other; medicines which will correct constipation in animals will have a similar effect on poultry.

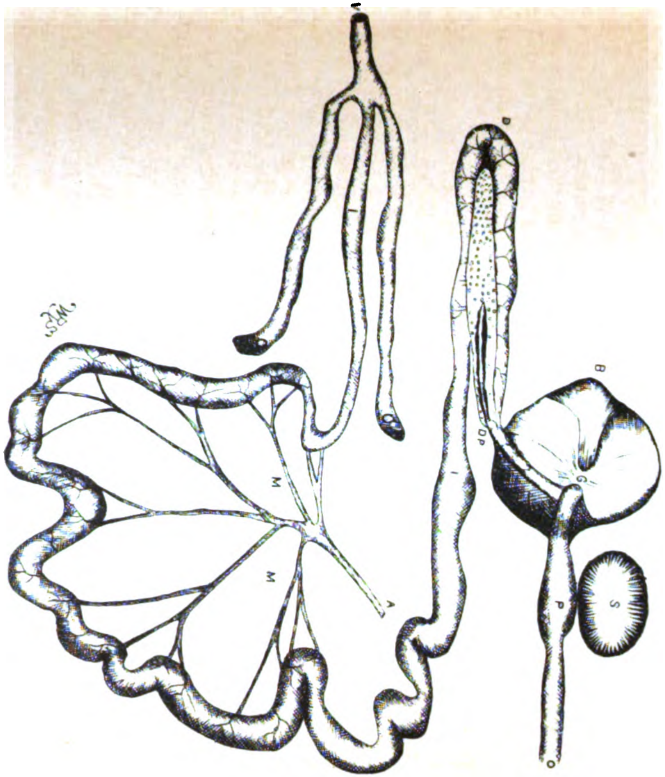
To enable the reader to form a more definite theory as to the natural location, condition, and use of these organs, the following illustrations have been taken from the writing of Prof. Maynard, and the description is condensed from the same source; the figures and letters of reference apply the same to both plates, and No. 2 is simply an enlarged view of a portion of No. 1.

The walls of the proventriculus, or first stomach, (P in Figs. 1 and 2,) are composed of numerous glands, packed in the smallest possible compass, in order to secure great strength and power without too great an increase in bulk; their arrangement on an enlarged scale may be seen at P in Fig. 2, where the proventriculus is laid open by a cut along its greater axis. In the same cut, O shows the longitudinal ridges of the lower gullet of which

M is the mucus membrane. These glands are peculiar in form, being furnished with bulbous projections, in one of which there is an orifice (shown in C o o, where the side and front view of the dissected cavity are given) through which the secretions flow into the cavity of the proventriculus; this fluid, or gastric juice, although highly digestive, has no influence on unbroken grain of any kind. During the passage of the food through the cavity, quantities of this fluid are exuded, and, with the material to be digested, pass into the stomach, or gizzard, (Figs. 1 and 2, G.) This organ, the stomach, is provided with a muscular coating, greatly thickened at the sides, (Fig. 2, F, where the gizzard is laid open,) while the extremities (T in Fig. 2) are much thinner.

The internal membrane consists of a horny lining (R in Fig. 2) much roughened. The peculiar arrangement of this stomach is admirably adapted to the purpose for which it is intended; the thick, red muscles of the sides (F in Fig. 2) are placed in longitudinal layers, while the thinner bluish, or white, but finer muscles of the upper and lower surfaces, and of the extremities, (T in Fig. 2,) are placed transversely; thus an opposite, or grinding, motion, though slight, is imparted to the roughened sides of the interior. This alone, however, is insufficient to act upon the outer coverings of the grains, even though they have been macerated and swollen to their utmost by the secretions of the crop and proventriculus. Conscious that it required an additional medium to assist in abrading the hard grain, the fowl picks up and swallows hard gravel or pieces of irregular-shaped stone, which, in addition to the above alluded to motive power, supplies the mill. Thus, though the fowl might be plentifully supplied with uncrushed grain, it would lose flesh, and finally starve were it not allowed access to gravel or some hard substance of a convenient size. Grains of corn taken from the furthest corner of the proventricular opening show that their outer coating has not been broken, and will still grow when planted. This proves most conclusively that the gastric and other secretions are incapable of dissolving the outer coatings of ordinary grains. Other grains of corn, but slightly scratched or abraded, soon began to digest under the influence of the solvent secretions.

After the contents of the stomach have been submitted to the grinding motion and solvent action of that organ, they pass out by an orifice known as the pyloric opening, (P o in Fig. 2,) which, in birds, is in close proximity to the proventicular entrance. This exit is guarded by a peculiar form of valve, which does not admit of the passage of stones and other large and hard objects unless the stomach becomes greatly distended. Thus only that portion which has been dissolved or ground very fine passes through. The digested matter, called chyme, goes onward through the fold of the intestine, known as the duodenum, (D, Fig. 1,) which inclose a peculiar gland known as the pancreas, (DP, Fig. 1;) it is, during its passage, mingled with the solvent pancreatic secretions, which enter into the intestine through a duct at DP, Fig. 1. The bile also enters the intestine at or about the same point; from this intestine the partially digested food passes into the smaller intestine (I, Fig. 1) where the lacteal vessels (M, Fig. 1) abstract the "chyle," or nutritious portion, and convey it to the arteries through vessels shown at A, Fig. 1. The remainder, passing down through the intestine, is further submitted to the action of other systems of lacteal tubes, situated in the accessory intestine, (C, Fig. 1;) these are simple sacs (cæca) having blind ends, where the process of absorption is prolonged to its utmost before the refuse matter passes on towards the vent.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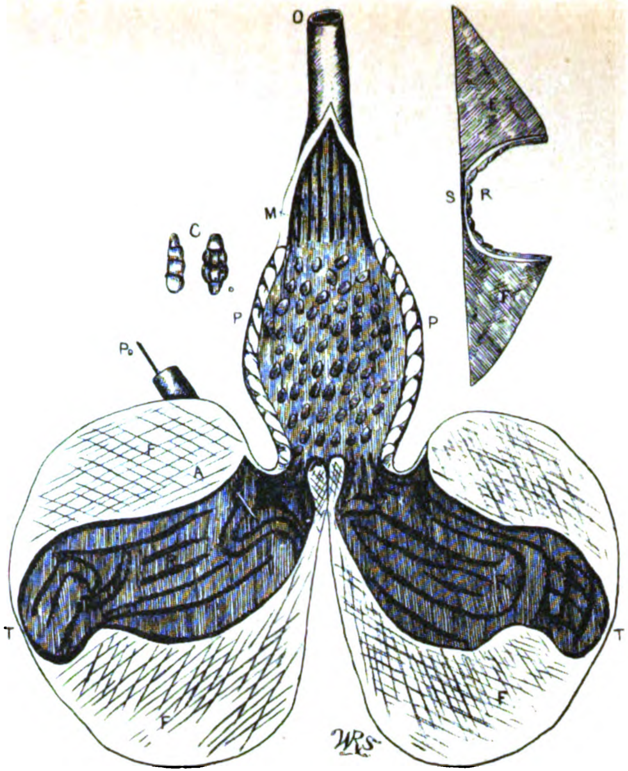
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Diseases.

Following the food from its entrance at the bill, the first of the series of the digestive organs which we usually find to be the seat of diseases is the "craw," or crop. This is, to all intents and purposes, but an inflation or swelling of the œsophogus, or gullet, and it is quite probable that some diseases are common to both, but by far the larger portion of the number to which the crop is liable are due to the improper retention of the food, and, hence, we may assume that the gullet is free from them entirely.

Crop-Choked or Crop-Bound.—If, after a season of deprivation, chickens are allowed an unlimited supply of green food, for instance, grass, young wheat, or other growing green matter, the crop will sometimes fail to pass its accumulating supply of moistened food into the gizzard. The crop swells to two or three times its original size, food accumulates, gases are formed, and, sooner or later, (unless relief is afforded,) inflammation sets in. The same effect is produced when hungry chickens are fed largely with dry oats. In fact, oats is a dangerous feed for poultry, as it is, of all, the most liable to swell up rapidly and choke the outlet of the crop. We have had the same trouble to take place when hungry chickens were fed on *partially* moistened cornmeal; it seldom, if ever, occurs when broken or whole corn is fed, because the nature of the grain prevents impaction, or packing. A careful examination of a case of "crop-bound" will show that the secretions from the proper glands have not been sufficient to properly moisten the food, and, hence, all efficient remedies have for their object either the supplying of proper moisture or an entire removal of the food by radical measures. In some cases, its removal may be secured by slight pressure accompanied with a rotatory motion. A slight pressure on the contents will, if the case has not gone too far, give immediate relief. The introduction, through the upper gullet, of a small portion of oil, lard, or even warm water will enable the operator to discharge the accumulation by a skillful motion or manipulation of the crop by external pressure. Too much force should not be used, because the lower gullet is not so strongly constructed as the upper one, and more liable to injury and inflammation. Where this fails, a last resort is to make a small external incision into the crop and remove the contents through this opening. After bringing the surfaces closely together, the cut may be secured by stitching with a common, or curved, needle and greased thread. Care must be taken not to let the fowl gorge itself with any kind of food, particularly whole grain, until the incision has entirely healed. A fowl which has once suffered from enlarged crop is always liable to a recurrence of the difficulty, for the organ seldom decreases to its normal size. In some very bad cases, the entire removal of the contents will be of little or no use, as the material will at once collect, even though fed in small amounts and at considerable intervals. On this account, it is always best to use soft or wet feed for some time after the operation. Such an incision should always be made in a direction lengthwise of the gullet, for the tendency to draw open again is much less in this than any other direction.

Inflammation of the Crop.—This disease is probably one of the most common of those which afflict this organ, and may be caused in numerous ways. A case of "crop-bound," caused by cornmeal, may be followed by inflammation; the bird may eat any one or more of a large number of poisonous substances whose presence may not be suspected. This being the first organ which the food reaches, or in which it remains for a sufficient time for injury, is, of course, the first affected. The treatment will vary with the substance which causes the difficulty. Woodroffe Hill thus gives directions for treatment:

"Mucilaginous or albuminous fluids, such as barley water, milk, and isinglass, or a thin solution of gum, should be freely administered after first evacuating the crop. Should phosphorus have been taken, magnesia should be given, followed by turpentine mixed in cream. Oil, being a solvent of phosphorus, must on no account be administered. Lead is often a cause of poultry poisoning when painters are about. The crop should be immediately evacuated, and half a spoonful of sulphate of magnesia and five minims of sulphuric acid, mixed in a wineglassful of water, be administered without delay. In a couple of hours, five grains of iodide of potassium may be given, in a dessert-spoonful of water. Afterward feed on mucilaginous liquids. If purging commences, give a teaspoonful of castor oil, with a grain of opium. Crude, or unslacked lime, is an irritant poison to fowls, producing inflammation of the throat, gullet, crop, gizzard, and intestines. Oil should at once be administered, followed by full and frequent doses of mucilaginous or albuminous fluids."

SOFT CROP.—Stephen Beale, in an article in the *Country Gentleman*, thus describes the cause and treatment of this disease:

"In some cases, when the crop is distended, there is no mass at all, and the distention is from a surcharge of water or air in the crop. The cause is very difficult to determine, but probably arises from some inability on the part of the organ to perform its functions. It may arise from excessive thirst, and consequent drinking to satisfy that thirst. But there must be some reason for this state of affairs. In a few instances, where the precautions already stated after a bound crop have not been taken, the crop is permanently enlarged, and the water or air gathers in it. An attempt should first be made to expel the contents by holding the fowl upside down, and pressing the crop with the hands. But if this does not secure the desired effect, it then becomes necessary to puncture the crop. A coarse darning-needle will do well for this purpose, and the incision, when made, will not need any artificial closing. A fowl so affected should be put in a pen by itself, where it cannot obtain food but that supplied to it, and be fed three times a day with very small quantities of soft food. A little water may be given, but only after each meal, and then be removed from the pen. It is advisable to acidulate it with a little nitric acid. Homœopathic tincture of nox vomica is very useful for the purpose of correcting this digestive derangement."

INDIGESTION.—Poultry, in common with all other kinds of farm stock, are very liable to attacks of indigestion. These are described by Beale as follows:

"An indolent appearance, as if the birds were unable to exert themselves, and a bad or depraved appetite; the food is hardly touched at all, and there seems no desire for natural diet; the face, if examined, has generally an unhealthy look, and the feathers lose their brilliancy; the droppings are scanty and fœtid, though there is sometimes an attack of diarrhœa; the breath is usually bad, and this is one of the best methods of diagnosing disease of the digestive organs."

The attention should first be directed to the removal of all diseased or improper material from the digestive organs. For this purpose, a mild purgative may be administered. This should be followed, in about six hours, with an ordinary rhubarb pill, which may, if necessary, be given every other day for two weeks or until the tendency to looseness has entirely disappeared.

In homœopathic treatment, Beale recommends the use of nox vomica and chamomilla, two drops of No. 3 tincture in a wine-glass of water, a teaspoonful to be given three times each day. The food should be well cooked and soft; small amounts of green food may be given, but unless great care is exercised, are dangerous; powdered charcoal should be mixed with all food, and is an excellent mixture for all diseases of the digestive organs of this class of farm stock. Like all other diseases of these organs, this one is liable to return, and the best remedy is to fatten the fowl as soon as possible.

DIARRHŒA.—Of this disease, the authority before quoted gives the following in relation to the causes and treatment:

"The preëxciting causes of this complaint are very numerous indeed, and it is impossible to enumerate them all. But fortunately the thing itself is so apparent that no one who takes the slightest interest in this stock can fail to discern it at once. The most frequent causes are improper feeding, and cold, and the presence in the intestines of some irritant. It is desirable, however, to note here that the slight looseness, by means of which nature sometimes corrects herself, should not be stopped. This is often the prevention of a serious disease, and thé use of some strong astringent would be productive of very serious harm. Unless, therefore, the diarrhœa continues and increases, it is not advisable to stop it. I should first suggest the use of bonemeal mixed with soft food. This is not useful as a cure, but is a great preventive of diarrhœa, especially with chickens, and should always be mixed with the soft food given to them. Boiled rice, in which some powdered chalk has been mixed, is also very useful in the earlier stages. If neither of these are successful, stronger measures are necessary. I have been most successful with chlorodyne, giving two drops in a teaspoonful of water, twice or thrice a day. This is usually effective in stopping the progress of the complaint. Failing that, a pill may be given, composed of a grain of opium and five grains of rhubarb. The fowl should be fed entirely on soft food, and have very little green meal after the diarrhœa has passed away."

CHOLERA.—This is preëminently a disease of the digestive organs, and one which occasions more loss in the poultry yard than all others combined. It is clearly contagious in its nature, and, like many contagious diseases, is caused by a specific germ. If the present theory is correct, it cannot originate in any poultry-yard, but must be produced by infected matter from diseased fowls. This may be conveyed by dogs, cats, or by almost any intermediate object. The germs once introduced into the flock, their eradication becomes a very difficult undertaking. The germs of the disease, being taken into the digestive organs with the food, are rapidly multiplied and very soon exist in such numbers as to produce death. The rapidity of their multiplication depends upon a variety of circumstances, among which temperature, water, food, and general care form a very important part. In some cases, an outbreak of the disease makes but little inroad upon the flock, and, in other cases, seventy-five per cent. die from its effects. When it has been once introduced, it is very easy to understand how it may be spread among the individual members with great rapidity. The manner in which poultry feed renders it particularly liable to spread among their fellows an epidemic disease, the germs of which exist in the excretions from the body.

A consideration of the nature of the disease would naturally lead us to suppose that cleanliness and thorough disinfection were absolutely necessary to effect a cure. As a cheap disinfectant for the germs, we know of nothing better than a dilute solution of sulphuric acid and water; eight to ten ounces of acid to as many gallons of water. It may be sprinkled over the floors and roosts from a common watering-pot, and may be applied to the sides and roof of the building by whitewash brushes. Hot whitewash thoroughly applied is also an excellent and inexpensive disinfectant. It should be carefully rubbed into all crevices and joints in the wood-work. All excrements should be carefully removed so that the fowls cannot come in contact with them. All places reached by the fowls should be carefully disinfected. Another cheap application is a solution of copperas and water, but to be of much value it will require a careful application, and should be repeated every few days until the disease disappears. Upon the authority of Koch, bichloride of mercury or corrosive sublimate is one of the best destroyers of infectious germs, but its use in the poultry-house is dangerous, as it is a well-known poison. Koch states that he has found that if it is applied in a solution in water in the proportion of one in from one thousand to five thousand, it will destroy the spore, or germ, of disease in a very few moments, and that he considers it to be the best for all cases of disease produced by germs. It has been claimed by some that very small but repeated doses of dilute carbolic acid will cure even bad cases, but practice has not yet proven that there is any reliable remedy. Koch has proven that inoculation, with the properly reduced virus of the disease, will give immunity from its attack, and that it is accompanied with very little risk of loss. The reports of the National Department of Agriculture state that solutions of carbolic acid in the proportion of three fourths of one per cent. very soon destroyed the spores in chicken cholera, and effectually prevented their further formation.

As a means of preventing the loss as much as possible, cleanliness in the houses and grounds is a very important adjunct, and, if carefully attended to, may do much to prevent serious outbreaks; cooked food is also an assistant in diminishing its ravages; camphor in the drinking water is regarded as important by many; charcoal mixed with soft food is also considered to be, not only a preventive, but also a cure, by many. In all cases prevention is better than cure; be careful to get fowls only from healthy stock, and introduce no new stock into the yard without knowing where it came from; if possible, test the efficacy of inoculation for yourself.

LIVER DISEASE.—Of this disease, Mr. Beale writes as follows:

"There can be no doubt that liver disease is hereditary, but it can also be induced chiefly by feeding on too rich foods and by improper conditions of life. I am firmly convinced that the great increase of liver disease in this country of late years has been due greatly to the use of maize, or Indian corn. This grain, strong as it is in the fat-producing elements, is far too rich for poultry-feeding, causing the development of internal fat, which is in itself an incentive of disease. For this reason, I am strongly opposed to the free use of this grain. The symptoms of liver disease are a moping about on the part of the birds, an irregular appetite, and there is generally a yellowish hue on the comb, face, and wattles. The best treatment is to give some aperient medicine, preceded by a couple of grains of calomel every other day. The homœopathic tincture of podophyllum is also a most useful remedy for this complaint, and can be used after the first dose of the aperient and calomel. It is hardly necessary to say that all rich food must be abandoned at once, and the fowls put on the plainest diet, the healthy as well as the affected fowls."

By far the greater majority of diseases in the digestive organs of poultry are due to improper management as to food or cleanliness. Filthy houses breed disease and increase the liability to loss from any and all contagious diseases. Other things being equal, an outbreak of cholera is always attended with more loss among fowls in dirty houses, or where they roost in exposed places. Sudden changes from dry to green food are responsible for many diseases. The fowls, after several days' or weeks' confinement in the house, are turned out and allowed to gorge themselves with green food; they become "crop-bound," lose flesh from excessive looseness of the bowels; and in other ways suffer from the change. On the other hand, fowls which have been running over the farm should not be penned up and deprived of all green food suddenly, or constipation will give more or less trouble; all changes in food should be made as gradually as possible.

It has been found that fowls confined in close coops will not fatten or increase much in weight after the first ten days or two weeks, and confinement is ascribed as the cause, but is much more likely due to the fact that the supply of gravel has been exhaused, and the food is not properly prepared for digestion. Regular supplies of gravel should be given to all fowls which have not free access to the bare ground; if they have the opportunity, they will obtain the necessary amount themselves, but if their natural supply is cut off, a substitute should be given to them.

DAIRY FARMING—THE COST OF BUTTER.

After the reading of an essay on "Dairy Farming in Northern Pennsylvania" at the Towanda meeting of the Board, the following discussion took place:

Dr. E. **Harvey** of Delaware. I think that the farmer of the eastern portion of the United States will not much longer have to dread the competition of the Western States. The lands will cease to be cheaper in the West, the new lands will all be taken up and settled, the time will come when they will be no cheaper than here, and we may look for this at no very distant day. It is a question of time, and possibly of a very short time, when the cities of the West, the great manufacturing industries, will grow and become larger, and thus there will be as much demand for farm produce there as here. And in this way the rivalry between the two sections will cease. This competition of farm products will then diminish. First, The land will increase in value and the population will become larger in the West than it is now, and I, therefore, think that we will not much longer have to dread the present state of affairs. Our present condition is incident to the rapid settlement of the new land in the West; these lands are now mainly occupied, and in less than ten years they will be out of the market. We are now in a transitory state. There was a time when it was thought that the woodland in the vicinity of Philadelphia must increase very much in value. Some purchased large tracts of woodland, thinking that it must always have a constant increase in value if near tide-water; the discovery of coal and the possibility of the cheap transportation of timber from the interior and northern counties of our State was not forseen. This was one step in the transition; railroads were constructed, and I well remember the first operation in railroads near Philadelphia. The objection then made upon the part of the farmers was that by doing away with the use of horses they would ruin the market for oats and corn as feed, that the sale of oats would be interfered with and it would cease to be a profitable crop, that everything raised on the farm would suffer by the construction of railroads, that the price of horses would be very much decreased; yet, notwithstanding this the price of horses has steadily increased. In fact, with every improvement in the country each individual product improves. This has been the case notwithstanding the competition with the cheap lands of the West, and I would, therefore, think that when the lands of the West increase in value, as they necessarily must do, we will gradually hear less and less of Western competition in farm products.

E. REEDER of Bucks. From the reading of the essay, I fail to understand what the profits of dairy farming in Northern Pennsylvania are. Quite a number of statistics were given showing the prices received, but these do not represent by any means the profits; the profits are represented by the difference between the actual cost of the product and its market value. I would very much like to hear from the essayist, or from some one present, an estimate of the cost of a quart of milk or a pound of butter.

J. W. INGHAM of Bradford. Mr. Pratt has given us an account of his dairying for seven years; he gives the number of pounds of milk, the value of the food consumed by the cows, and you will find a full and complete statement in the United States Agricultural Report for 1864.

J. I. CARTER of Chester county. As I have a creamery of my own, I may possibly be able to throw some light upon the question as asked by Mr. Reeder. I know little as to the milk, but as I do not keep any cows but buy all the milk which I use, I am not able to give you its cost of production. I have made a careful calculation as to last year's transaction, and the average in our county runs from fifty to seventy-five dollars of milk product per head. To illustrate it a little plainer, I would say that at one of our late creamery meetings I gave the proceeds of my creamery last year, the number of pounds of butter made and quarts of milk purchased, the average price received for the butter, and the average price paid for milk. As the gentleman has said, figures do not furnish very interesting reading, but I will ask your indulgence while I present them in a condensed form, as follows:

BUTTER ACCOUNT OF LAST YEAR, 1884, AND 1885.

	Lbs. butter made.	*Quarts of milk to lbs. of butter.*	*Aver'e price of butter.*	*Price of milk per qt.*
April 4,	4,762	10 2/7	40 1/8	3 1/16
May,	6,366	10 2/5	34 1/2	2 7/8
	1,821 1/2	10 5/6	26 1/4	2 1/4
June,	9,076	9 1/3	24	2
July	8,351	10 1/2	25	2
August,	7,685	9 5/7	25	2
September,	7,504	9	30 1/2	2 1/2
October,	5,679	8 13/14	37 1/2	3
November,	4,389 1/2	9	40	3 1/2
December,	4,568	9	39	3 1/2
January,	4,907	9 1/4	36 5/8	3 1/2
February,	4,813	9 1/6	37 3/4	3 1/2
March,	5,869	9 2/5	33 3/4	3

This ran on about in this way: The average price for the year was two and ten thirteenths cents for each quart of milk. The average quantity to each pound was nine and one half quarts. We made during the year seventy-five thousand three hundred and forty pounds.

This might throw a little light on the profit of keeping cows, if you can tell about the quantity your cows will make. These are figures from our books that are reliable.

Perhaps it would be interesting in this connection to show the value of skim-milk for hogs—we feed it to our hogs—we keep about one hundred in our dairy. I weighed our hogs on the first of April, when we took an account of stock, and in order to show something about their gain, we weighed them at the end of twenty-six days.

HOG ACCOUNT OF APRIL, 1885, SHOWING THE GROWTH OF HOGS, AND VALUE SKIM-MILK FOR FOOD.

The following lots of hogs gained as follows in twenty-six days:

21 gained 820 or $1\frac{1}{2}$ pounds per day.
7 " 155 or $\frac{22}{26}$ " "
11 " 320 or $1\frac{3}{26}$ " "
6 " 170 or $1\frac{2}{26}$ " "
20 " 280 or $\frac{14}{26}$ " "

The average gain on the sixty-five hogs was one and one fourth pounds per day. The value of gain was four dollars and eighty cents per hundred weight, which equals five cents per day. The increase in value on one hundred head, my present stock, equals five dollars per day, or one hundred and fifty dollars per month. During the month, we received one hundred and forty-two thousand seven hundred and twenty-six pounds of milk. We made butter in that time amounting to five thousand eight hundred and twenty-one pounds. We sold some skim-milk, but had eleven thousand four hundred and thirty-one gallons left for feeding to our stock. Now, if we estimate the value of the product and the gain of the hogs, it leaves the value of the skim-milk at something over one cent per gallon. The hogs were simply fed skim-milk and a little grain, to keep their stomachs in good order.

NOTE BY THE SECRETARY.—All attempts to fix the exact cost of a quart of milk, or, in fact, of any farm product, are met with difficulties which are incident to location and surroundings, and which are constantly varying with these surroundings and the season and animals. A difference in the value of the land, which may occur within a very narrow circle, may very materially affect the data from which the calculation must necessarily be made. The data obtained from a single cow cannot be accepted as a duplication of ten, nor can the result which is obtained from ten cows be taken as a criterion by which the production of twenty-five may be calculated. One of the greatest difficulties which surrounds all attempts to obtain reliable data as to the cost of any farm product is the great difficulty of inducing farmers to place a proper value upon labor; for instance, one of our correspondents gave us, with great apparent certainty, the cost of a pound of butter from his dairy; further inquiry developed the fact that he had made no charge for milking or making the butter, because "the boys and girls (four in number) did all of the work, and received no wages." In many cases, when a fair estimate is arrived at, it is not accepted by practical men, simply because it includes "everything" which goes to make up the expense. Upon the other hand, much difficulty is also experienced because farmers will not make a fair allowance for products used in the family. One of our dairy correspondents, in giving the cost of a pound of butter, gave no credit for the milk, cream, and butter consumed by his family of seven. As the dairy contained but ten cows, and the family probably consumed the product of almost two of these, it will readily be seen that the data was misleading and not acceptable. In other cases which we might note, no credit was given for a calf from each cow each year, although the calves were kept on the cows until four weeks old, and then sold for veal at a fair price. In another dairy of seven cows, no credit was given for calves, because "the butcher who supplied the family with beef got the calves, and they about paid the annual beef bill." In many cases, no credit was allowed for manure, but all feed and hay was charged upon the other side of the account. In order to arrive at a fair estimate of the cost of a quart of milk, it will be necessary to know all of the conditions under which the milk was produced, and every item upon either side of the account should have due credit. Even with all of this, we will find that the estimates of practical men, owing to differences in management, will vary very much. No item should be considered too small to be taken into account, and every quart of milk used by the family should be fairly credited.

In addition to the data brought out in the discussion, we add the following results from the milk of fourteen dairies, all taken to and sold at one creamery. If to these figures each of our readeas will apply his own data as to annual cost of keeping, work, marketing, &c., he will be able to answer the question *from his own stand-point*, but even then he will find it difficult to convince his neighbor that the figures so obtained represent the cost of a quart of milk. The figures are as follows:

	Number of cows.	Total number pounds milk.	Money received net from factory.	Average amount of milk per cow in pounds.	Net cash to patrons per cow.
No. 1,	18	76,454	$750 84	4,247	$41 71
No. 2,	12	36,648	360 28	3,054	30 02
No. 3,	27	110,706	1,091 65	4,100	40 44
No. 4,	23	61,609	600 41	2,678	26 10
No. 5,	18	86,290	847 40	4,793	47 07
No. 6,	45	151,503	1,486 89	3,367	33 04
No. 7,	10	45,772	448 10	4,572	44 81
No. 8,	28	124,773	1,229 45	4,420	43 91
No. 9,	17	58,115	565 19	3,418	33 24
No. 10,	10	38,301	361 26	3,836	36 12
No. 11,	12	46,202	451 85	3,850	37 65
No. 12,	15	55,187	546 96	3,612	36 46
No. 13,	18	83,297	822 50	4,627	45 69
No. 14,	10	50,608	489 98	5,060	48 99

Tabulated Analyses of Commercial Fertilizers issued by the Pennsylvania State Board of Agriculture.

From samples selected by the Secretary of the Board, or its agents, in accordance with the provisions of the act of June 28, 1879. Analyses by Professor F. A. GENTH, University of Pennsylvania, West Philadelphia, Pa. Valuations are based upon an allowance of 9 cents per pound for soluble and reverted phosphoric acid; 5 cents for insoluble phosphoric acid from bone, and 4 cents in mixed fertilizers, which derive it mainly from tankage, fish, &c., and 2 cents when derived from S. C. rock; potash, 5 cents, and ammonia, 18 cents per pound.

All correspondence relating to the correctness of the analyses should be directed to the chemist, as above; all relating to the correctness of the samples should be directed to the Secretary of the Board at Harrisburg, Pa. Attention to this will save vexatious delay to correspondents.

It should be remembered that the column of "Comparative Commercial Value" is obtained by multiplying the number of pounds of each element in a ton by the market price per pound in the market at the commencement of the fertilizer year; hence, this amount makes no allowance for freight, commission, &c.

Complete Fertilizers.

Record number.	NAME OF FERTILIZER.	NAME AND ADDRESS OF MANUFACTURER.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Ammonia.	Comparative commercial value per ton.	Record number.
199	Ammoniated Bone Phosphate,	Zell Guano Company, Baltimore, Md.,	4.86	3 60	3.06	0.96	2.23	26.70	199
200	Pen-Mar Ammoniated Phosphate,	W. Davidson & Co., Baltimore, Md.,	4 81	3.46	2.53	2.41	1.50	24.72	200
201	Favorite Phosphate,	Continental Guano Company, Baltimore, Md.,	4 07	3.33	1.94	1.87	1.83	22.83	201
203	Dissolved Raw Bone,	F. Mehring, York Road, Md.,	6.73	12 56	0.49		2 04	42.55	203
205	No. 2 Ammoniated Phosphate,	" "	4 40	6.38	3.04	0 81	1 85	29.30	205
206	Twenty-Six Dollar Phosphate,	" "	5.99	4.97	4.67	0.49	1.15	28.10	206
207	No. 1 Ammoniated Phosphate,	" "	5 71	7.01	2 78	0 89	1 64	31.91	207
208	Standard Bone Phosphate,	Hubbard Brothers, Easton, Md.,	5.58	4.79	1.71	2.86	2 72	32.69	208
209	Ammoniated Soluble Bone,	D. Blocher & Co., Baltimore, Md.,	5 09	3.89	1.77	1.17	0.64	21.06	209
210	Nobesque Wheat Fertilizer,	Glidden & Curtis, Boston, Mass.,	7.48	3 85	3.00	1.07	1.47	29.15	210
212	Soluble Pacific Guano,	" "	7.96	2.74	3.65	0.84	2.62	32 45	212
213	Wiest's Phosphate,	Jacob Wiest, Spring Forge, Pa.,	0.94	1.73	1 45	1.20	2.06	14 59	213
214	Ammoniated Raw Bone Phosphate,	J. Horner, Jr., & Co., Baltimore, Md.,	6.17	3 17	3.40	3.02	1.67	28 56	214
215	Dissolved Slaughter-House Bone,	" " "	3.67	11.48	2.79		3.46	42 52	215
216	Pure Dissolved Bone,	C. H. Dempwolf & Co., York, Pa.,	5.17	8 32	3.47		4.48	43 70	216
217	Special Favorite Phosphate,	Russell Coe, New York,	8 64	2.47	0 81	1.49	2.43	30.89	217
218	Kenderdine Phosphate,	T. S. Kenderdine, Newtown, Pa.,	4 91	6.10	4 68	3.65	4.48	42.51	218
221	Standard Bone Phosphate,	Hubbard Brothers, Easton, Md.,	6.47	4.73	2.49	2 00	2.50	33.24	221
222	Climax Phosphate,	" "	5.56	4 50	1.07	2.96	1.29	26.74	222
224	Marl,	From Eastern Shore of Maryland,			0.06	0.32		0.32	224
225	Good Luck Guano,	R. J. Ruth Company, Baltimore, Md.,	6 80	3.45	3.57	1 17	2.30	30.76	225
226	Plow Brand Phosphate,	Walton, Whann & Co., Wilmington, Del.,	5 30	4 51	2 88	2 21	3 48	34 70	226
227	Soluble Bone Fertilizer,	Russell Coe, New York,	4 37	3.44	5.14	1.21	0.83	22 37	227
228	Muriate of Potash,	N. J. Chemical Company, Philadelphia, Pa.,	...	...	...	51.04	...	51.04	228

Complete Fertilizers—*Continued.*

Record number.	NAME OF FERTILIZER.	NAME AND ADDRESS OF MANUFACTURER.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Ammonia.	Comparative commercial value per ton.	Reco.d number.
229	Complete Fertilizer,	John Taylor & Co., Trenton, N. J.,	7.97	3.02	2.63	2.47	3.81	36.45	229
230	Union Co. Fertilizer,	T. Glaser, Linden, N. J.,	4.66	1.98	5.51	0.23	2.50	25.59	230
231	Raw Bone Phosphate,	S. D. Stouffer, Marietta, Pa.,	0.08	6.25	4.13	7.73	1.84	29.04	231
232	Planet Phosphate,	Peninsular Fertilizing Company, Smyrna, Del.,	6.10	2.06	1.43	2.19	1.67	24.03	232
235	N. C. Lime Phosphate,	North Carolina Lime Phosphate Company, Raleigh, N. C.,			8.80	0.12		3.64	235
236	Ammoniated Phosphate,	J. Horner, Jr., & Co., Baltimore, Md.,	3.34	5.03	3.32	2.93	1.67	26.67	236
237	Star Bone Phosphate,	J. E. Tygert & Co., Philadelphia, Pa.,	5.37	3.09	2.80	2.92	2.06	27.81	237
238	Twenty-five Dollar Phosphate,	Baugh & Sons, Philadelphia, Pa.,	4.99	3.11	3.16	0.96	2.22	26.06	238
239	Royal Bone,	Williams, Clark & Co., New York,	5.47	5.09	1.70	2.46	1.33	27.62	239
241	Soluble Alkaline Phosphate,	Chemical Company of Canton, Baltimore, Md.,	3.34	4.95	6.65	2.09		19.65	241
242	Locust Point Compound,	G. Ober Son's Company, Baltimore, Md.,	7.82	5.94	0.98	1.65	1.82	33.75	242
243	Farmers' High-Grade Phosphate,	Davidson & Scarlett, Greencastle, Md.,	5.68	4.78	3.61	2.25	1.76	30.31	243
245	Dissolved Animal Bone,	J. W. Stonebreaker & Co., Hagerstown, Md.,	6.68	6.02	1.76	1.34	2.72	35.44	245
246	German Soluble Bone,	W. B. Seal, Baltimore, Md.,	5.17	8.18	1.34	0.13		24.70	246
248	Ammoniated Corn Fertilizer,	E. Snowden, Baltimore, Md.,	4.87	2.90	5.28	2.45	1.32	25.41	248
249	Manure for Fruit Trees,	Mapes Formula Company, New York,	8.97	1.30	0.58	10.08	2.33	37.42	249
250	Baker's Standard Guano,	Chemical Company of Canton, Baltimore, Md.,	6.33	3.23	3.08	1.67	2.31	29.66	250
251	Buffalo Ammoniated Phosphate,	L. L. Crocker Company, Buffalo, N. Y.,	7.66	2.07	1.27	0.74	4.19	34.35	251
252	S. C. Bone and Potash,	J. Richmond, Philadelphia, Pa.,	2.59	5.65	3.53	1.20	. .	17.54	252
253	National Tobacco Fertilizer,	U. S. Chemical Company, Philadelphia, Pa.,	3.75	5.00	3.79	2.31	2.03	28.40	253
254	National Complete Phosphate,	" " "	5.77	6.02	1.64	2.68	1.89	32.01	254
255	National Super-Phosphate,	" " "	5.65	4.36	3.09	1.84	1.96	29.39	255
256	National Soluble Bone,	" " "	8.83	4.55	1.02	1.62	2.87	37.90	256
258	Good Luck Guano,	R. J. Ruth Company, Baltimore, Md.,	6.81	3.44	3.33	0.96	2.05	29.45	258
260	National Potato Fertilizer,	U. S. Chemical Company, Philadelphia, Pa.,	4.55	4.17	2.97	4.39	2.83	32.66	260
261	Raw Bone Phosphate,	C. H. Miller, Sellersville, Pa.,	3.47	2.64	7.98	1.80	2.07	25.62	261
263	Bone Phosphate,	T. S. Kenderdine, Newtown, Pa.,	7.14	4.35	2.71	4.98	3.89	41.83	263
265	Lycoming County Fertilizer,	Lycoming Chemical Company, Williamsport, Pa.,	0.06	3.90	4.66	0.73	2.35	20.05	265
266	American Phosphate,	Williams, Clark & Co., New York,	4.64	6.17	0.24	1.51	2.22	29.14	266
267	Ammoniated Phosphate,	J. J. Turner & Co., Baltimore, Md.,	8.23	2.65	2.12	0.77	2.70	32.00	267
269	Granger Fertilizer,	Granger Fertilizer Company, Philadelphia, Pa.,	3.50	4.82	2.07	1.55	2.58	27.58	269
270	New Departure Fertilizer,	" " "		1.26	0.79	0.41	0.23	4.10	270
272	Phuine,	Moro Phillips, Philadelphia, Pa.,	5.07	2.31	2.70	2.03	2.79	27.51	272
273	Rose Bone Phosphate,	Equitable Fertilizer Company, Baltimore, Md.,	3.57	7.13	3.01	1.53	0.76	26.04	273
277	Standard Peruvian Guano,	Christian & Co., Philadelphia, Pa.,	2.37	7.36	6.47	2.07	8.68	56.01	277
278	Lobos Peruvian Guano,	" "	1.55	6.99	7.32	7.86	5.48	48.84	278

Acidulated S. C. Rock.

Record number.	Name of Fertilizer.	Name and Address of Manufacturer.	Soluble phosphate acid.	Reverted phosphate acid.	Insoluble phosphate acid.	Comparative commercial value per ton.	Record number.
10	Dissolved Phosphate,	Maryland Fertilizing Company, Baltimore, Md.,	9.85	6.00	1.68	20.20	10
14	Philadelphia Standard Phosphate,	United States Chemical Company, Philadelphia, Pa.,	7.94	5.73	2.19	25.58	14
21	Dissolved S. C. Rock,	Susquehanna Fertilizing Company, Baltimore, Md.,	6.96	5.27	4.48	25.90	21
22	Acid Phosphate,	W. Kenderdine, Lumberville, Pa.,	8.90	5.01	3.49	26.26	22
82	Dissolved Phosphate,	Ceres Manufacturing Company, Baltimore, Md.,	10.62	2.09	2.54	23.90	82
39	Good Luck Acid Phosphate,	J. A. Cranston & Co., Newport, Del.,	6.44	6.16	4.16	24.34	39
40	Soluble Bone Phosphate,	Moro Phillips, Philadelphia, Pa.,	10.62	5.48	1.50	29.53	40
47	Dissolved S. C. Bone,	E. Snowden, Baltimore, Md.,	6.36	5.92	4.66	23.96	47
64	Rasin Acid Phosphate,	Rasin Fertilizer Company, Baltimore, Md.,	8.49	5.63	1.18	23.89	64
94	Dissolved S. C. Rock,	Susquehanna Fertilizer Company, Baltimore, Md.,	7.19	5.79	4.37	25.11	94
109	Dissolved S. C. Rock,	Sharpless & Carpenter, Philadelphia, Pa.,	8.70	4.70	4.94	26.10	109
111	Dissolved S. C. Rock,	J. E. Tygert & Co., Philadelphia, Pa.,	9.04	3.56	2.39	23.64	111
112	Acidulated Phosphate,	N. J. Chemical Company, Philadelphia, Pa.,	9.39	4.90	0.45	25.90	112
122	Diamond Sol. Bone,	Walton, Whann & Co., Wilmington, Del.,	6.17	7.88	2.27	27.20	122
126	Dissolved Bone Phosphate,	Chesapeake Guano Company, Baltimore, Md.,	5.71	7.35	3.70	24.99	126
131	Yearsley's Sol. Phosphate,	U. S. Chemical Company, Philadelphia, Pa.,	10.41	3.00	2.20	25.11	131
132	Dissolved S. C. Bone,	Dambmann Brothers & Co., Baltimore, Md.,	8.43	5.95	2.84	27.11	132
144	Acid Phosphate.	J. Richmond, Philadelphia, Pa.,	9.40	4.69	2.36	26.30	144
146	Diamond State Sol. Bone,	Lord & Polk, Odessa, Del.,	5.26	7.96	4.05	25.42	145
147	T. & P. Acid Phosphate,	Waring Fertilizer Company, Colora, Md.,	8.58	6.71	2.65	28.53	147
160	Acid Phosphate.	N. J. Chemical Company, Philadelphia, Pa.,	9.29	6.16	1.23	23.30	160
167	Acidulated S. C. Rock,	Baugh & Sons, Philadelphia, Pa.,	7.83	5.93	3.61	26.21	167
171	Powell's Dissolved S. C. Bone,	Brown Chemical Company, Baltimore, Md.,	6.81	7.31	0.54	27.47	171
172	Dissolved Phosphate,	Maryland Fertilizing Company, Baltimore, Md.,	12.45	4.04	1.32	30.20	172
185	Dissolved S. C. Bone,	Slingluff & Co., Baltimore, Md.,	9.45	6.33	1.16	29.95	185
204	Acid Phosphate.	F. Mehring, Bruceville, Md.,	7.35	6.17	4.15	26.90	204
211	Dissolved Bone Phosphate,	Glidden & Curtis, Boston, Mass.,	7.64	5.50	3.73	25.82	211
219	Dissolved S. C. Bone,	Dambmann Brothers & Co., Baltimore, Md.,	10.64	3.32	2.61	27.25	219
220	Acid Phosphate,	Chemical Company of Canton, Baltimore, Md.,	7.99	6.24	2.07	26.44	220
223	Soluble Guano,	Hubbard & Brothers, Easton, Md.,	9.20	5.84	3.05	28.29	223
240	Acid Phosphate.	Williams, Clark & Co., New York,	9.72	4.04	0.49	24.97	240
244	Dissolved S. C Rock,	Patapsco Guano Company, Baltimore, Md.,	9.62	5.06	2.67	27.49	244
257	Philadelphia Standard Phosphate,	U. S. Chemical Company, Philadelphia, Pa.,	11.23	4.58	2.31	29.38	257
264	Diamond State Sol. S. C. Rock,	Lord & Polk, Odessa, Del.,	6.91	5.31	3.88	24.45	264
271	Soluble Bone Phosphate,	Moro Phillips, Philadelphia, Pa.,	9.82	5.75	0.96	25.41	271

Ground Bone.

Record number.	NAME OF FERTILIZER.	NAME AND ADDRESS OF MANUFACTURER.	Insoluble phosphoric acid.	Ammonia.	Comparative commercial value per ton.	Record number.
23	Pure Raw Bone,	C. W. Miller, Mifflin Cross Roads, Pa.,	21.64	5.00	39.64	23
48	Pure Bone Dust,	W. Kenderdine, Lumberville, Pa.,	22.57	6.10	44.53	43
66	Pure Bone Meal,	Thomas Hoy, Orwigsburg, Pa.,	21.28	5.04	39.40	66
91	Pure Ground Bone,	Parnassus Fertilizing Company, Parnassus, Pa.,	18 16	4.54	34.50	91
93	Ground Bone,	Susquehanna Fertilizer Company, Baltimore, Md.,	22.57	5.29	41.61	93
95	Bone Meal,	N. W. Fertilizer Company, Chicago, Ill.,	17.27	3.20	28.79	95
96	Pure Raw Bone Meal,	Jacob Trinley, Limerick Station, Pa.,	19 75	4.92	37 46	96
100	Bone Meal,	W. A. Hoveler & Co., Pittsburgh, Pa.,	19.24	4.81	36.56	100
102	Pure Ground Bone,	Allegheny City Fertilizer Company, Allegheny City, Pa.,	24.50	5.19	43 18	102
103	Fine Raw Bone,	N. W. Fertilizer Company, Chicago, Ill.,	24.28	4 56	40.70	103
106	Bone Dust,	Sharpless & Carpenter, Philadelphia, Pa.,	22.34	4.73	38.34	106
110	Button Bone,	Emil Wahl, Philadelphia, Pa.,	24.36	4.67	41.17	110
116	Banner Bone Flour,	Michigan Carbon Works,	20.16	3.72	33.55	115
135	Pure Ground Bone,	N. W. Fertilizing Company, Chicago, Ill.,	24.00	4.55	40.38	136
142	Swift Sure Bone Meal,	M. L. Shoemaker & Co., Philadelphia, Pa.,	21.11	5.86	42.21	142
151	Ground Bone,	Jacob Ulmer, Pottsville, Pa.,	22.08	4 99	40.04	151
161	Bone Meal,	Allegheny City Fertilizer Company, Allegheny City, Pa.,	24.74	4.93	42 49	161
174	Superior Bone Meal,	Cleveland Dryer Company, Cleveland, Ohio,	23.38	4.72	40.27	174
180	Pure Bone Meal,	Lancaster Chemical Company, Lancaster, Pa.,	21.06	4.14	35.96	180
189	Pure Ground Bone,	C. H. Dempwolf & Co., York, Pa.,	22.10	5.73	43.71	189
259	Stamped Bone,	Peter Swank, Numidia, Pa.,	20 42	5.35	39.68	259
262	Stamped Bone,	J. H. Hauze, Rock Glen, Pa.,	20.26	5.34	39.48	262
268	Button Bone,	Leopold Moritz, Philadelphia, Pa.,	25 18	4.91	42 86	268
274	Never Failing Bone,	M. Berg, Philadelphia, Pa.,	17.24	4.10	32.00	274
275	Button Bone,	Emil Wahl, Philadelphia, Pa.,	24.46	5.27	43.43	275
276	Fine Ground Bone,	D. Galbraith, Philadelphia, Pa.,	17.45	4.57	33.90	276

INDEX BY SUBJECTS.

Page.
Abortion among dairy stock, 73-79
Action of lime, 53
Address by Hon. R. E. Pattison, 13
Address by Hon. J. P. Wickersham, 11
Address by Creamery Aid Association, 6
Agricultural investments, 27
Agricultural societies, 24-274
Alkaline salts, 36-38
Annual tickets at county fairs, 35
Analyses of fertilizers, 41-44
Annual report of Secretary, 27-79
Analyses of milk, 119-133
Answer to the prophecy, 197-200
Agriculture diversified, 64
Annual meeting, minutes of, 4-8
Autumn meeting, minutes of, 11-28

Best breed of sheep, 170-174
Beef, cost of, 46-50
Beebe, M. C., obituary notice of, 16
Barnes, J. P., remarks of, 22
Beans, value of, 57-59
Black-birds, food of, 157-159
Board of Agriculture, members of, 1
Board fences, cost of, 52
Barley straw, value of, 57
Birds' food, 150-157
Breeding horses, 272
Butter, analysis of, 221
Butter, digestion of, 251
Butter, yields of, 231

Cat-bird, food of, 154
Celery, culture and profit of,
Carter, J. I., remarks of, 284
Changing seed, 68
Corn crop, 290
Cost of beef, 46
Cost of pork, 50
Cost of fencing, 51
Commercial fertilizers, 38
Comparative value of stock foods, 58
Cochran, C. B., on milk, 115
Corn, germination of, 97
Crops of 1885, 27
Crops, average of in Bradford county, 114
Cream tests, 126
County agricultural societies, 34
Crop-bound in poultry, 279
Cholera in chickens, 281
Clover hay, value of, 59
Chickens, diseases of, 277
Crops, exhaustion by, 55

Dairy farming, 284
Dairies, reports from, 287

Page.
Deductions in stock-feeding, 59
Depth for planting wheat, 69
Delegates, list of, 3
Diversified agriculture, 64
Diseases of live stock, 31-34
Diseases of poultry, 277-283
Drift soils, 89

Effects of forests, 180
Effects of coal-tar on cut-worms, 102
Effects of different crops, 55
Effects of first impregnation, 61
Experiment station in New York, 96

Fertilizers, selection of, 36
Fertilizers, value of, 38
Fertilizer analyses lists, 41
Fertilizers, low grade, 44
Fertilizers, application of, 38
Fertilizers, questions about answered, 81
Fencing, cost of, 51
Fencing, report of committee on, 22
Feeding, deductions in, 59
Feeding cattle, cost of, 40
Fencing, economy in, 53
Feeding as a cause of abortion, 77
Forests, effect of, 175
Fruit, report of committee on, 23
Fruit, uncertainty of, 23
Free tickets at county fairs, 35
Fungoid disease of fruit, 23

Geological thoughts on soils, 85
Governor, address of, 13
Grape phylloxera, 71
Grades of fertilizers, 44
Grades for the farmer, 184
Grain, analyses of, 57
Guernsey milk, analyses of, 136
Guernsey breed of cows, 201
Glimpses of Lancaster county, 205
Growing corn, 103

Herr, J. A., remarks of, 21
Hallett, experiments of, 64
Hog cholera, 33
Horse and his treatment, 266
Huidekoper, R. S., remarks of, 73

Investigation of diseases, 31
Ingham, J. W., on dairy farming, 105
Indigestion in poultry, 280
Inflammation of the crop in poultry, 279

January meeting, minutes of, 3
June meeting, minutes of, 8

	Page.
Jordan, W. H., remarks of,	84
Koch, on abortion,	76
Lancaster county, glimpses of,	205
Legislation relating to oleomargarine,	224
Lancaster, minutes of meeting at,	11
Lactometer tests of milk,	122
Liver, diseases of in poultry,	282
Lime, action of,	53
List of members,	1
List of officers,	2
List, fertilizer analyses,	41
Linseed cake, value of, as manure,	57
Linseed cake, value of, as food,	59
Long-wool sheep,	171
Low-grade fertilizers,	44
Members, list of,	1
Minutes of meetings,	3-26
Marl, value of,	45
Methods of milk analyses,	119
Milk, report on,	115
Milk to the pound of butter,	284
Milk for pigs,	285
Milk, cost of,	286
Middle wools,	172
Mucilaginous drinks for poultry,	280
Musselman, C. C., remarks of,	20
New York experiment station,	96
Native stock,	184
New York, oleomargarine law of,	225
Northern Pennsylvania farming,	105
Ninety-nine cent fertilizer,	45
Oat straw, value of,	59
Oat crop,	30
Oat crop, exhaustion of,	57
Oleomargarine and imitation butter,	219-265
Outlook for the wheat crop,	29
Oliver, M. C., remarks of,	22
Peach yellows, eradication of,	23
Pennsylvania crops,	27
Peach curl,	79
Phosphoric acid, value of,	40
Planting corn,	102
Piollet, V. E., remarks of,	103
Pork, cost of,	52
Potato crop,	30
Premium beef, cost of,	52
Profit of sheep,	170
Prophecy, answer to,	197
Profits of celery,	214
Production of Guernseys,	204
Progeny affected by previous impregnation,	61
Pleuro-pneumonia,	33

	Page.
Quince culture,	195
Report of dairy committee,	15
Report of fence committee,	22
Report of fruit committee,	23
Report of Secretary,	27-79
Results of milk tests,	133
Roland, W. S., remarks of,	13
Rittenhause test for milk,	120
Selection of fertilizers,	36
Selection of seed,	63
Seed, changing,	66
Seed corn,	28
Sheep for profit,	170
Saxon improved sheep,	173
Satterthwaite, E. S., remarks of,	231
Splenic fever,	32
Specific gravity of milk,	124
Steers, feeding,	49
Steers, cost of premium,	43
Summer meeting, minutes of,	8
Solebury Farmers' Club, resolution of,	22
Soiling cattle,	66
Soft crop in poultry,	280
Susquehanna county, cows in,	112
Sturtevant, Dr., remarks of,	101-102-103
Sugar-making for profit,	189
Standard of milk,	142
Sugar beets, exhaustion of,	57
Swine fever,	33
Tests for cream,	128
Thoughts on soils,	85
Thoroughbreds for the farmer,	184
Then and now,	215
Tioga county, cows in,	112
Thrush family,	154
Tramp in his legal aspect,	165
Tuberculosis,	32
Turnips, exhaustion of,	57
Turnips, food value of,	59
Turnips as stock food,	60
Web worm,	71
Wayne county, cows in,	112
Weight of premium steers,	48
Wickersham, J. P., remarks of,	11-19
Wire fences, report on,	22
Wheat crop,	28
Wheat crop, outlook for,	29
Wheat, exhaustion of,	57
Wheat, value of as food,	59
Wheat straw, value of,	59
Wheat damaged, as food,	60
Wood ashes, value of,	57
What is a farmer?	188

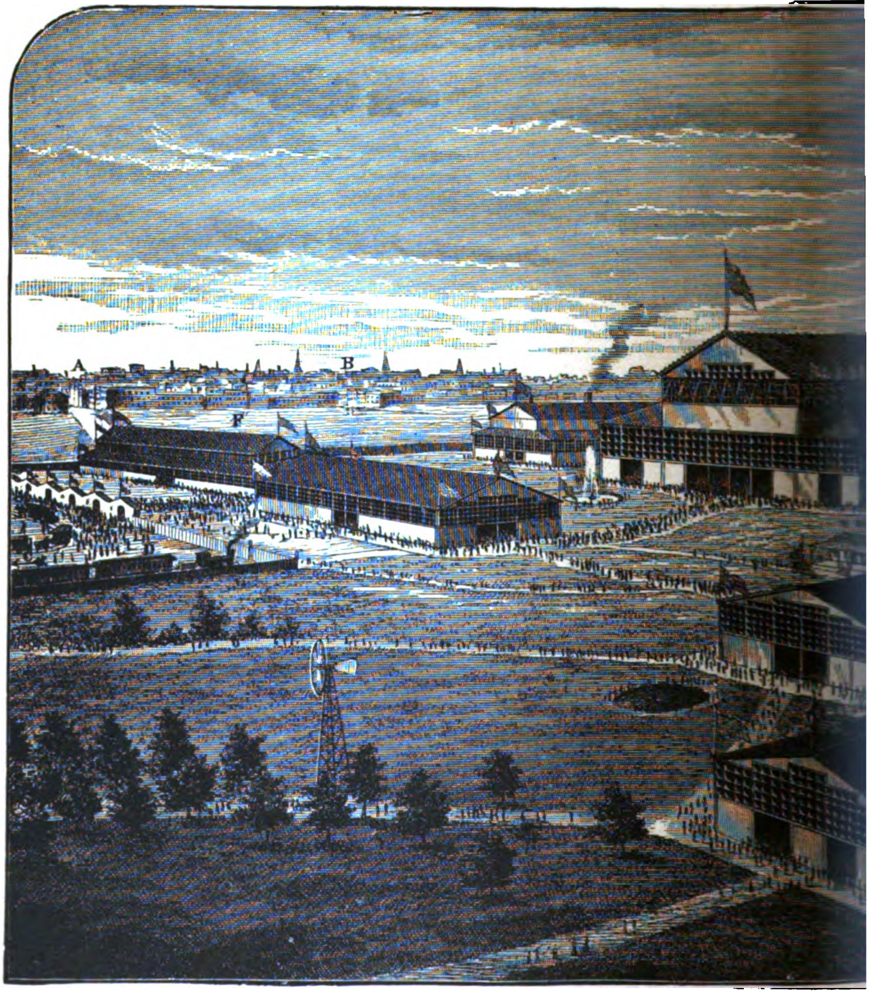
BUILDINGS

PENNSYLVANIA STATE

BROAD STREET AND

Thirty-first Annual Exhibition,

Manufactures, Machinery, Impleme



BIRD'S-EYE VIEW LOOKING SOUTH-WEST FROM POINT NEAR

REFERENCES.—A, Fifteenth Street; **B,** Sixteenth Street; **C**←——→, to Broad Street a
North Pennsylvania Divisions;) **E** C

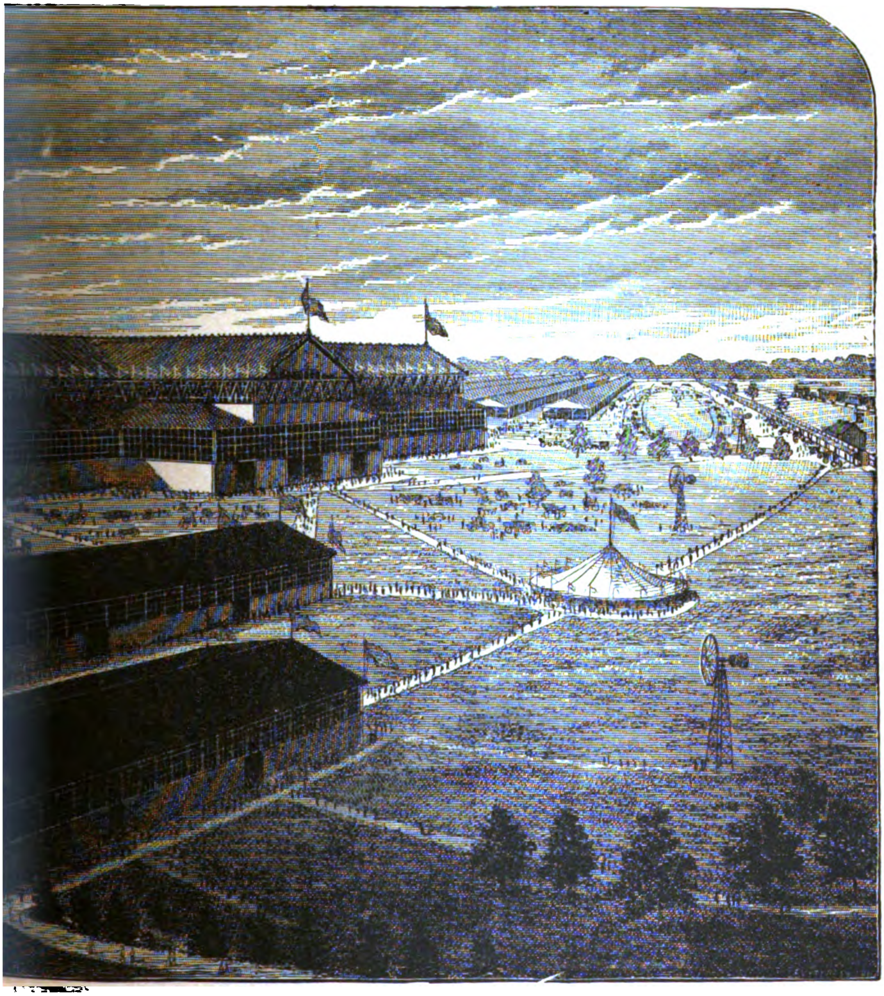
GROUNDS

RICULTURAL SOCIETY,

ENUE, PHILADELPHIA.

nber 23d to October 14th, 1885.

Apparatus, Produce and Live Stock.



MANTOWN JUNCTION, PENNSYLVANIA RAILROAD, PHILADELPHIA.

Lehigh Avenue; D, Special Station Philadelphia and Reading Railroad, (Bound Brook, Germantown, and necting Railroad; F, Huntingdon Street.

Legislative Document, No. 4.

MINUTES OF THE TRANSACTIONS

OF THE

PENNSYLVANIA

STATE AGRICULTURAL SOCIETY.

1885.

CONTENTS.

I. Preliminary Notice.

II. Proceedings of Executive Committee, elected 1884.
  Including Reports on Competitive Trial of Wind-Mills.
  Experiments with Premium Seed Wheat and Oats.
  Analyses of Milk of Prize Cows of Distinct Breeds.

III. Proceedings of the Society.

IV. Proceedings of Executive Committee, elected 1885.
  Including Reports on Governor's Message.
  Carp Culture in Chester and Lancaster Counties, Pa.

V. Schedule of the Classification of the Exhibition, 1885, *a*. Section I.
  b. Section II.

VI. Awards of the Juries, *a*. Section I.
  b. Section II.

VII. Essays.

VIII. Constitution and List of Members.

OFFICERS OF THE SOCIETY FOR 1885.

PRESIDENT.

A. WILHELM, York, York County.

VICE PRESIDENTS,

1. George Blight, Philadelphia.
2. L. H. Twaddell, West Philadelphia.
3. John Hunter, Philadelphia.
4. William M. Singerly, Philadelphia.
5. Burnet Landreth, Bristol, Bucks county.
6. David H. Branson, Atglen, Chester county.
7. William H. Holstein, Bridgeport, Montgomery county.
8. Tobias Barto, Reading, Berks co.
9. S. S. Spencer, Lancaster, Lancaster county.
10. Daniel H. Neiman, Easton, Northampton county.
11. D. J. Waller, Bloomsburg, Montour county.
12. Ira Tripp, Scranton, Luzerne county.
13. J. S. Keller, Orwigsburg, Schuylkill county.
14. Gabriel Hiester, Estherton, Dauphin county.
15. Joseph Piollet, Wysox, Bradford county.
16. Robert P. Allen, Williamsport, Lycoming county.
17. John A. Lemon, Hollidaysburg, Blair county.
18. John S. Miller, Huntington, Huntingdon county.
19. Chauncey F. Black, York, York county.
20. L. A. Mackey, Lock Haven, Clinton county.
21. George Rhey, Millwood, Westmoreland county.
22. F. Y. Clopper, Greensburg, Westmoreland county.
23. W. W. Speer, Pittsburgh, Allegheny county.
24. John McDowell, Washington, Washington county.
25. J. A. McKean, Pittsburgh, Allegheny county.
26. J. D. Kirkpatrick, N. Liberty, Mercer county.
27. J. C. Thornton, Fairview, Erie county.

At large, J. A. Paxson, Philadelphia.

ADDITIONAL MEMBERS EXECUTIVE COMMITTEE.

By Election.

Abner Rutherford, Paxton, Dauphin county.

William Taylor, Womelsdorf, Berks county.

John H. Ziegler, Harrisburg, Dauphin county.

Jefferson Shaner, West Chester, Chester county.

Ex-Presidents.

Frederick Watts, Carlisle, Cumberland county.

David Taggart, Northumberland, Northumberland county.

William S. Bissell, Pittsburgh, Allegheny county.

Jacob S. Haldeman, Harrisburg, Dauphin county.

James Miles, Girard, Erie county.

Ex-Officio.

D. W. Seiler, Harrisburg, Dauphin county, *Recording Secretary.*

John B. Rutherford, Harrisburg, Dauphin county, *Treasurer.*

Elbridge McConkey, Harrisburg, Dauphin county, *Corresponding Secret'y.*

Alfred L. Kennedy, Philadelphia, *Chemist and Geologist.*

William H. Egle, Harrisburg, Dauphin county, *Librarian.*

I. PRELIMINARY NOTICE.

The administration of the Pennsylvania State Agricultural Society has, during the year 1884-85, principally directed its efforts to the completion of the improvements on its exhibition grounds at Philadelphia, and the holding thereon of its thirty-first annual exhibition. Of all the measures for the promotion of agriculture which devolve upon the Society, these were felt to be the most pressing, and early in the spring of 1885 plans for the laying out, grading, and surfacing of the walks and drives and for the extension of the track for the parades of cattle and the trials of horses, were matured. The changes in the locations of stalls and other sheds made necessary by this extension were also decided on, and, as the season opened, contracts for the work were received and satisfactorily confirmed, and it was proceeded with.

The exhibition of 1884 had conclusively shown the need of increased accommodations for exhibitors. The financial condition of the Society required the expenditure of the least possible sum in providing such accommodations, and delayed and embarrassed the decision on the plans of the additional buildings. These were, after due consideration, agreed upon, contracts for their erection let, and the structures completed in time for occupancy. Such of them as may be regarded as annexes to buildings put up the year preceding have been made to harmonize with those buildings, while the new Floral Hall, in location, accommodations, and height, constitutes a most attractive feature of the grounds.

When the Society abandoned the practice of migrating from city to city in the holding of its exhibitions, and located itself permanently, it necessarily substituted substantial buildings for the temporary ones to which it had been accustomed, and those last erected are believed fully to conform to the requirements. A neat and tasteful police office and an express office were erected in proximity to the executive offices. The latter were enlarged by the addition of an annex for the telegraph offices, and for those having business at the Treasurer's office, adjoining. The space thus gained in the interior was neatly fitted up and furnished for the office of the President. A grand stand was put up on the line of the extended track, and protected by a roof. The space beneath the staging, thus secured against rain, was readily let for restaurant purposes. The galleries constructed in the main building since the preceding exhibition notably improved the accommodations. In one of them, devoted to educational appliances and systems, a kindergarten was in operation daily, and the Indian pupils from the male and female branches of the Lincoln Institution showed their aptitude for acquiring the primary education, and some of the mechanical occupations of the whites.

The introduction of the electric light into the grounds and exhibition buildings rendered them as attractive during the evening as they were during the day, but the unpleasantness of the weather prevented many from availing themselves of the opportunity who would otherwise have done so.

The excessively hot weather of the early weeks of September, 1884, when the exhibition of that year was held, told so unpleasantly on live stock and visitors that the Committee of Arrangement postponed the opening of the exhibition of 1885 until the 21st of that month. Before its close, unusually cool weather and the so-called "equinoctial storm" set in, rendering the temperature uncomfortable within as well as without the buildings, reducing the number of visitors, and, therefore, the sum of the receipts below those of the preceding year.

In order to broaden and intensify the interest in certain departments of the show, arrangements were made with societies organized for the purpose of promoting the objects constituting these departments. This had been done in 1884, especially with the Pennsylvania State Poultry Society and the Philadelphia Kennel Club, to each of which the use of a building for its show had been given. To them, this year, the Society of Arts had been added, and to it the main building assigned. Largely composed of Philadelphia manufacturers, the Society filled the spacious building allotted, and with a much finer collection of manufactured goods than that of last year. The bench show of dogs was also remarkably fine, while that of poultry surpassed any show previously held in this country. The advantages of securing coöperation in these three departments were, therefore, abundantly proved.

The grading of the milk of a cow by the number of pounds of butter which can be made from it has, on account of its inexactness, never found favor with this Society. By the retention of buttermilk, the addition of salt, &c., the weight of the product of the churn, in proportion to the milk from which it is obtained, may be caused to vary greatly. The chemical analysis of the milk, so far as its butter-fat and its casein, or cheesy matter, are concerned, is a much more trustworthy test of its value for dairy purposes. This test the Society has had applied to the principal breeds, the milk of more than one animal of each breed having been taken for the purpose.

Experiments to test the value in cultivation of the seed-grain awarded prizes at the Society's exhibitions have been continued, and the question of carp-culture has received attention. Reports on these subjects, as well as on that next-above mentioned, will be found included in the proceedings of the Executive Committee.

The multiplication of wind-mills, the variety in their construction, and their many applications to the obtaining of water-supply, to drainage, to the storage of power, and to cutting, threshing, sawing, and grinding, all serve to render a competitive trial of the principal kinds in the market most desirable and important. Immediately after its appointment, the Committee of Arrangement of the exhibition deputed a sub-committee to make the necessary preparations for the trial. All sources of error were, as far as practicable, avoided. A mechanical expert was engaged to conduct the trials, and the report, which will be found in its proper place in this volume, is believed to be the most complete and trustworthy that has emanated from any agricultural organization.

The Society's standing offer of prizes for essays on agricultural subjects continues to bear good fruit.

A. L. K.

II. PROCEEDINGS OF THE EXECUTIVE COMMITTEE.

OFFICE OF THE STATE AGRICULTURAL SOCIETY, HARRISBURG, PA.,
TUESDAY EVENING, *January 20, 1885.*

The members of the Executive Committee of the State Agricultural Society having assembled in the office of the Society pursuant to call, at 7.30, P. M., they were called to order by President Miles.

The minutes of the last meeting were partly read by Secretary McConkey, when, on motion of Mr. **KELLER**, the further reading at length was dispensed with.

On motion of Mr. **WILHELM**, seconded by Mr. **MCKEAN**, the parts of the minutes to be gone over were read by their titles.

On motion of ex-President **TAGGART**, the minutes were then adopted as read.

The **PRESIDENT**. The next business in order is the calling of the roll of members.

This having been done, the following gentlemen were found to be present: Messrs. Landreth, Branson, Barto, Neiman, Tripp, Keller, Hiester, Miller, Mackey, Speer, McDonnell, McKean, Wilhelm, Abner Rutherford, Taylor, Ziegler, Taggart, Kennedy, J. B. Rutherford, Egle, McConkey, and Seiler.

The **PRESIDENT**. If it is the pleasure of the meeting, the report of the Committee on Cereals, representing Chester county, will be read.

Mr. **BRANSON**, from the Committee on Cereals, read the report on

EXPERIMENTS WITH PREMIUM SEED WHEAT AND OATS.

Third Annual Report of Committee on Cereals, representing Chester county; on account of the Pennsylvania State Agricultural Society for the year 1884.

HARRISBURG, *January 20, 1884.*

MR. PRESIDENT AND GENTLEMEN: Your committee appointed by this Society beg leave to submit this third annual report upon the different cereals hereinafter enumerated. In carrying out these experiments in a manner calculated to produce the best and most satisfactory results, especial care throughout the entire management should be observed; thorough cultivation and fertilization are almost indispensable and are important factors in order to make a good showing in these, our annual reports, and from a strict observance of the above, timely cropping, and planting only the most approved and popular varieties of seeds, we have obtained results of great value to every progressive farmer or tiller of the soil. And more especially have we obtained the best results from seeds that have been awarded the first prize by the appointment of competent juries by this Society.

We must not, however, be unmindful of the recognition that some of the noted seedmen of the State are manifesting in our new departure, by the voluntary contribution of seeds; notably among whom are Landreth & Sons, of Philadelphia, and Samuel C. Wilson, of Mechanicsville, Bucks county, Pa., both of whom have furnished your committee with choice varieties of wheat, namely: "Landreth's wheat," by Landreth & Sons, of Philadelphia, and the "Valley wheat," by Samuel C. Wilson, of Bucks county, Pa., which will be noticed in our next annual report.

The following is the result of an impartial test of three different varieties of wheat, namely: Martin's Amber, Fultz, and Stubble Red.

Plot No. 1, Martin's Amber wheat, sowed September 20, in drill at the rate of one and a half bushels the acre, and four hundred pounds Coe & Richmond's phosphate applied in drill with the wheat; yield, thirty-three and a quarter bushels the acre.

Plot No. 2, Fultz wheat, two bushels seed to the acre, and same treatment as to fertilizing, cultivation, and time of planting; yield, thirty-one bushels eight pounds the acre. On Plot No. 3, Stubble Red wheat, two bushels seed, and other conditions throughout same as on Plot No. 1 and No. 2; yield, thirty-four bushels two pounds. The Martin's Amber wheat, although not the most prolific in this, our last report, has largely redeemed itself from its previous record in other tests.

OATS, OR SPRING CROP.—With this particular cereal we have made quite a specialty, and have obtained marked results. In our last report, we noticed the yield from two ounces Burpee's Welcome oats to be one hundred and sixty pounds. This seed, with all due allowances for shrinkage and other contingencies, was sowed on Plot No. 1, (or two acres,) on the 11th day of April last. The yield therefrom was one hundred and sixty bushels, of an extra quality of grain, which was awarded the first prize at the last exhibition of this Society. Its vigorous growth, early maturity, and extraordinary quality of grain speak volumes in its favor, and we hope to still continue its cultivation on other plots. Plot No. 2, Challenge oats, yield forty-eight bushels ten pounds the acre, weighing thirty-five pounds struck measure, or fifty-two bushels twenty-six pounds legal measure. On Plot No. 3, White Belgian oats, yielding forty bushels nine pounds the level bushel, or forty-one bushels seventeen pounds legal measure. The three above-named varieties of oats we continued from last year's planting, having abandoned all others heretofore mentioned in our annual reports.

The White Russian oats has a stiff straw and is a vigorous grower, but its lateness of maturity condemns it for our planting. Thus far, our experience with this particular cereal—the contest, evidently, with us is between the Welcome and Challenge, both of which are rapid growers, very productive, of early maturity, and extraordinary quality of grain. Last oats-harvest was a very tedious one on account of heavy and continuous rains, but, by cutting and harvesting our early oats one week earlier, we secured our crop without one drop of rain, whilst the oats cut at the usual time in our locality were almost worthless on account of wet. Last, though not least, we might state that the various plots under cultivation were liberally fertilized with a high grade of phosphate, manufactured by Coe & Richmond, whose works are located on Delaware river, at Mantuapoint, New Jersey. Their agent, Mr. John Oakford, located in Oxford, Pennsylvania, informed your committee that during the year ending April 1, 1884, they had manufactured and sold sixteen thousand tons. Its excellent results, at least upon our soil, recommend it as a valuable commercial fertilizer.

DAVID H. BRANSON,
Committee.

REPORT OF VICE PRESIDENT JOHN McDOWELL, WASHINGTON COUNTY, ON GRAIN-GROWING TESTS.

To JAMES MILES,
President of the Pennsylvania State Agricultural Society:

As a member of the committee to make practical tests of different varieties of wheat, some of which samples in bags were exhibited at our fair in Allegheny City, I have continued these tests up to the present, with part of the varieties, both as field and patch trials. I regret to say the yield of the harvest of 1884 was below that of 1883 of the three varieties selected as the best of the crop of 1883, while I used a greater amount of Bowker's phosphate. It had no effect on the one fourth acre (which was the best ground) that I could notice. While this one fourth acre yielded more per acre than the field crop, it was because of a richer soil. The fall of 1883 was too dry and not favorable to quick growth, and the test was by no means as satisfactory as I desired. The varieties selected to continue the test were Martin's Amber, Fultz, and Stubble. These I name in the order of value. Martin's Amber is, without doubt, one of the finest varieties ever raised in Washington county. It winters well, stools out more strong stalks, stands up well, and yields largely; the grain is large and uniform; is excellent for flour. It has been tried by many of my neighbors, who report favorably without exception. The Fultz variety is too well known to speak of. I would state, however, I improved my seed of the same kind by sowing Fultz wheat obtained of D. H. Branson, of Chester county. I have found the Stubble wheat an excellent variety, well worth the raising, though not up to the others, except for flour, in which it surpasses.

I have not given the yield, per acre, of the field crops; though good, it was below twenty bushels, each yielding in the order named, Martin's first and highest, next the Fultz, then the Stubble. The one fourth acre of Martin's Amber had the best of soil, and was heavily manured by top-spreading, and mixed in with drill, which also put on the phosphate; the yield of this patch was twenty-nine bushels per acre. I cannot speak of the others in patches. Owing to the dry season, the tests have not yielded as largely as desired or expected.

In making these tests, the measurement of the rain-fall, no doubt, would aid in obtaining the comparative value of tests made in different localities.

At present, I have several varieties seeded down for further trial, some of which did not come up for thirty days; much of the seed malted. This is all owing to the extreme drought—the longest I have seen in Washington county—but few and light showers from July 1 to January 1, 1885.

Dr. KENNEDY. Mr. President, I would say in regard to the report of Mr. Branson, that I had the pleasure of examining the crop of wheat while standing, on the day it was cut, and I can testify to its remarkable cleanliness, and to the care manifested in its division into plots. I paid a visit to the preceding crops—those of the year 1883—and not having been able to get here at our last meeting, I was not able to make a verbal report. I rise now for the purpose of suggesting to the Executive Committee whether or not it would be desirable for us—that is, for the Society—to do a little more than merely to have a visit paid to the crops on the day before the cutting. In order to give due value to these experiments, it appears to me that they should be reported upon very fully, as far as it is practicable to do so, by a committee. In that way, the crop being taken care of, so to speak, by a committee present at the time of the cutting, the community would be impressed, I think, far more favorably with the results than at present appears. We have entire confidence in the gentlemen who conduct these experiments, and our object is to bring their work before the public in a way to win its confidence. These experiments have outgrown, I presume, the intention of the originator—can not we do more with them than at present, by having a properly constituted committee visit and report upon the cutting and other details? I was desired to go, and I have been for two or three years on the grounds at the time indicated, and I do not know that it is necessary for me to do anything more; but I think there ought to be a report by a committee which should be there prior to and during the cutting, and perhaps also a longer time, so as to be able to give as much information on these experiments as possible. I want to hear from Mr. Branson. He has devoted a great deal of time, and I know a great deal of skill also to this matter.

Mr. **Branson**. I might say that the Doctor's visit was a very pleasant one. I was glad to see him there to see what we were doing. We have been experimenting in good faith, and with good results, which are appreciated by the people in our locality. I am sorry these experiments have not been more generally known. As an onslaught has been made upon us by the Executive of this State, it would be well to show more generally our good works. The bad ones will get before the public without any effort at all. To do any good with our Society, it is necessary to have as extensively published as we can the experiments that have been conducted, which have been so entirely satisfactory to ourselves, and those who have access to them. While under cultivation the plots have been visited, largely by people of the surrounding neighborhood. We have now under cultivation ten different varieties of wheat, in ten different plots, for another report, if we live. The prospects thus far are quite as good as we can expect, the results of our soils with the oats particularly. I have a sample of the grain of one particular variety. We have discarded, as I have said, all, with one exception or two; and also with the varieties of, wheat, and the same with corn. I have not the reports ready of the experiments with corn. They are too late to go into our volume.

In regard to the committee seeing the cutting, threshing, and so on, I would just state when we have ready our different plots we haul in each plot separately, and have that covered with the phosphate sacks over the entire surface of the mow, and then we pile on another plot until all are in. We have not room to keep them in different mows, or in different parts of the barn, but we have kept every part entirely distinct from the other, from the fact of having phosphate bags placed between each one of the different plots of grain, and between every plot of grain we have left eighteen inches to two feet, making it clear of the others. We can cut one plot without interfering with another. It strikes me if there is any advantage in making these experiments—and I claim there is—in different localities. that feature ought to be brought out. We are making these tests in different counties, and if any particular variety proves to be the best in all, it certainly speaks volumes in its favor; and I would suggest, if these experiments are going to be made to do good that we ought to have some four or five hundred copies of the reports for distribution outside of our volumes? We know that everything that is done in the State Board of Agriculture is thrown to the breeze by quarterly reports. A few copies of our reports would cost but little; if they are going to be of any use to us or the agricultural community, let them be printed. I should like to have the views of gentlemen upon that subject. I have my report submitted here, and it sets forth what we have done in good faith.

The PRESIDENT. Will there be any further discussion of the report?

Mr. McDOWELL. I think the suggestion of Mr. Branson a very good one. That may be done with little cost. To publish one would answer the purpose, and the report of that committee would not cause the delay, as suggested by Mr. Branson, of one year in its publication. The report might be received, if satisfactory to the Publishing Committee, and be embodied in the publication of that same year.

I have this to say, however, in regard to the tests we are now making in Washington: I would like to have the committee come and examine the wheat there. We have had no show at all. We have never had as dry weather as we have had this season—at least I have never seen it. We have not had water amply sufficient to supply the stock, commencing with the first of July up to January of this year; the wheat actually laid in the ground some thirty days before it made its appearance, and then very sickly. Much of it is mouldy; in fact, it is impossible for it to be otherwise, some coming up about forty days after it was sown. A great many plowed and re-sowed their fields with mangel wurzels.

Now, as to the practical benefits or results of this system of experiments, I desire to state when the report was published and put in circulation, it brought a demand for some of the varieties of wheat, and among them was Martin's Amber. That wheat has been taken to Lebanon, in the southwestern part of Missouri; it has been called for between this point and that, and, in the East, the demand has extended into Hanover in Germany. There it has gone before the agricultural societies of that remote country, and been distributed—I know by published report sent to me—to four different agricultural societies to make tests there. This was based on the annual report of the actual test made in this State.

I think the Society is doing a good work, notwithstanding the Governor's message, and I think this is one way by which its works are made beneficial. We might extend the tests beyond merely the "staff of life," or the wheat growths.

Mr. Branson has gone further than I have, for I have only experimented on the oats known as the Brockspats, giving as much as seventy bushels to the acre. All was not measured, except the drill measure. Other measurements were made by actual fill, and so on.

Now, I think in regard to the corn and the root crops, these tests might also be made, and by spring I hope to be able to test the spring crops. But as to the wheat crops, I had no encouragement to invite the committee there, and yet my stand of wheat was a fair representation of that throughout our part of the country.

The PRESIDENT. What disposition do the gentlemen wish to make of the reports?

Secretary McCONKEY. They will be received and filed and incorporated in the proceedings, unless there is some further order.

Dr. KENNEDY. I do not rise to make a motion, but merely to say that I was a witness to the interest taken by the neighbors of Mr. Branson in his experiments. My remarks had reference to the interest taken by the community at large.

The PRESIDENT. The next report in order is that of the Committee on Carp.

Secretary SEILER. That is in Dr. Egle's hands, and he is not present. I have the report on wind-mill tests.

COMPETITIVE TRIAL OF WIND-MILLS.

Made by direction of the Pennsylvania State Agricultural Society, September 18 to 27, 1884, on the Society's exhibition grounds, Broad street and Lehigh avenue, Philadelphia.

To the President of the Pennsylvania State Agricultural Society:

In organizing the test, the Society used all possible means to communicate with manufacturers of wind-engines throughout the United States and Canada; and in issuing their premium list, they inserted a notice referring to the proposed test, which contained the following clause:

"That valuable practical information may thus be gained upon the application of the true principles which govern the construction of such machines, and that the general efficiency of all may be materially improved, the Society invites all manufacturers of wind-mills to make entries for exhibition and trial; and of lift and force pumps, to make full exhibits."

To endeavor to have a comprehensive test, the Society sent special invitations to the manufacturers of the following known makes of engines or mills, viz:

I X L wind engine,	Kalamazoo, Mich.
Bird wind engine,	Kalamazoo, Mich.
Manvel wind engine,	Kalamazoo. Mich.
Stover wind engine,	Freeport, Ill.
Eclipse wind engine,	Fairbanks.
Star wind engine,	Kendalville, Ind.
Globe wind engine,	Goshen, Ind.
Enterprise wind engine,	Sandwich, Ill.
Iron turbine wind engine,	Springfield, Ohio.
Halladay wind engine,	Batavia, Ill.
Challenge wind engine,	Batavia, Ill.
Champion wind engine,	Waukegan, Ill.
Perkins wind engine,	Mishawaka, Ind.
Althouse wind engine,	Waupin, Wis.
Kennedy wind engine,	Philadelphia, Pa.

And also sent notices to the leading agricultural papers in the United States and Canada, and to prominent secular papers. Those who entered the test were as follows:

Halladay wind engine, by the U. S. Wind Engine and Pump Company,	Batavia, Ill.
Leffel wind engine, by the Springfield Machine Co.,	Springfield, Ohio.
Perkins wind engine, by A. L. Jones,	Mishawaka, Ind.
Kennedy wind engine, by S. W. Kennedy,	Philadelphia, Pa.
Manvel wind engine, by B. S. Williams & Co.,	Kalamazoo, Mich.

These five mills entered for the competitive trial, which it was intended should continue for a period of twelve days, but owing to defects in the working of the testing apparatus, the starting of the trial was delayed from September 8 to September 18, at 3.45, P. M. It continued until Saturday, September 27, at 4.30, P. M., having run continually under test for a period of nine days and three quarters of an hour, the test having been continued for one week after the close of the fair.

In organizing the test, it was understood that the mills should be the commercial ten-foot mills, and be erected in the same manner as if they were being put up in the ordinary course of business.

The size and kind of pump was left to the selection of the exhibitor, and it is noted that in the Hallady mill an exceedingly large, single-acting pump was used, which, when worked by a wheel four inches greater in diameter than the others, in the fresh winds experienced, gave large results. While this mill pumped a large quantity of water in the strong winds experienced during the test, had the winds been light, it is questionable as to its being able to perform the proportional large duty required of it. The remaining mills used their regular commercial wind-mill pumps, such as are commonly used in this section of the country, except, perhaps, the Kennedy mill, which had a double-acting pump of considerable size.

The following are brief descriptions of the wind engines entering into the test, setting forth their general construction and principle of operations, and said descriptions are illustrated wherever suitable engravings have been furnished.

HALLADAY WIND ENGINE.

This mill was exhibited by the United States Wind Engine and Pump Company, of Batavia, Illinois, whose agent or representative at the fair was George Canby, 201 South Thirteenth street, Philadelphia.

The diameter of the wheel is ten feet four inches, and the peculiar construction is fully referred to hereinafter. The diameter of the turn-table, upon which the wheel and vane are supported, is sixteen and one half inches. The sweep from the center of the turn-table to the end of vane is ten feet. The weight of the wheel, vane, and iron-work, exclusive of pump and pump-rod or pitman, is four hundred pounds.

The general construction of the mill may be described as follows, reference being had to the accompanying illustration marked Fig. 1, which represents a sectional elevation through the upper part of the mill or engine:

A represents the bed-plate, or casting, which rests upon the top of the masts *M*, which masts are framed into a tower or derrick of sufficient height to give the wind-wheel a free current of air. This bed-plate has sockets projecting down, and the masts fit in these sockets and are securely bolted to the casting; it is further secured by two rod braces *E*, only one of these braces being shown. Upon this bed-plate revolves the turn-table *B*, which is so constructed as to fit entirely over the bed-plate and securely protect the track and rolls (hereafter described) from the weather. This turn-table is secured to the bed-plate by means of clamp bolts shown at *K*. Anti-friction rolls are used for the turn-table to turn on, constructed on the same principle as heavy bridges are turned, so as to give as little friction as possible, and allow the mill to head up to the wind in very light breezes. These anti friction rolls are very durable, and require no oiling. They run on a smooth track provided both on the bed and turn-table.

S represents the main shaft of the wind-wheel, which rotates in Babbitt-lined boxes, and has keyed to the outer end the spider *Y*, to which the main arms or spokes *A* of the wind-wheel are bolted. On the inner end of this shaft is keyed the crank plate *N*, to which is attached the pitman *L*. By means of the post attachments, consisting of the sleeve box *S*, swivel box *X*, sliding boss *Z*, connection is so made between the pitman and pump that the revolving of the turn-table upon the bed-plate will not twist or cramp the connection, or prevent the sails being furled or spread by means of the shut-off rod *R*. The great peculiarity and main point of success in the Halliday wind-mill is the arrangement of its regulating gear, consisting of the sliding collar *D*, elbow *Y*, front plate *C*, and other connections.

SECTIONAL ELEVATION
OF
10 FOOT MILL.

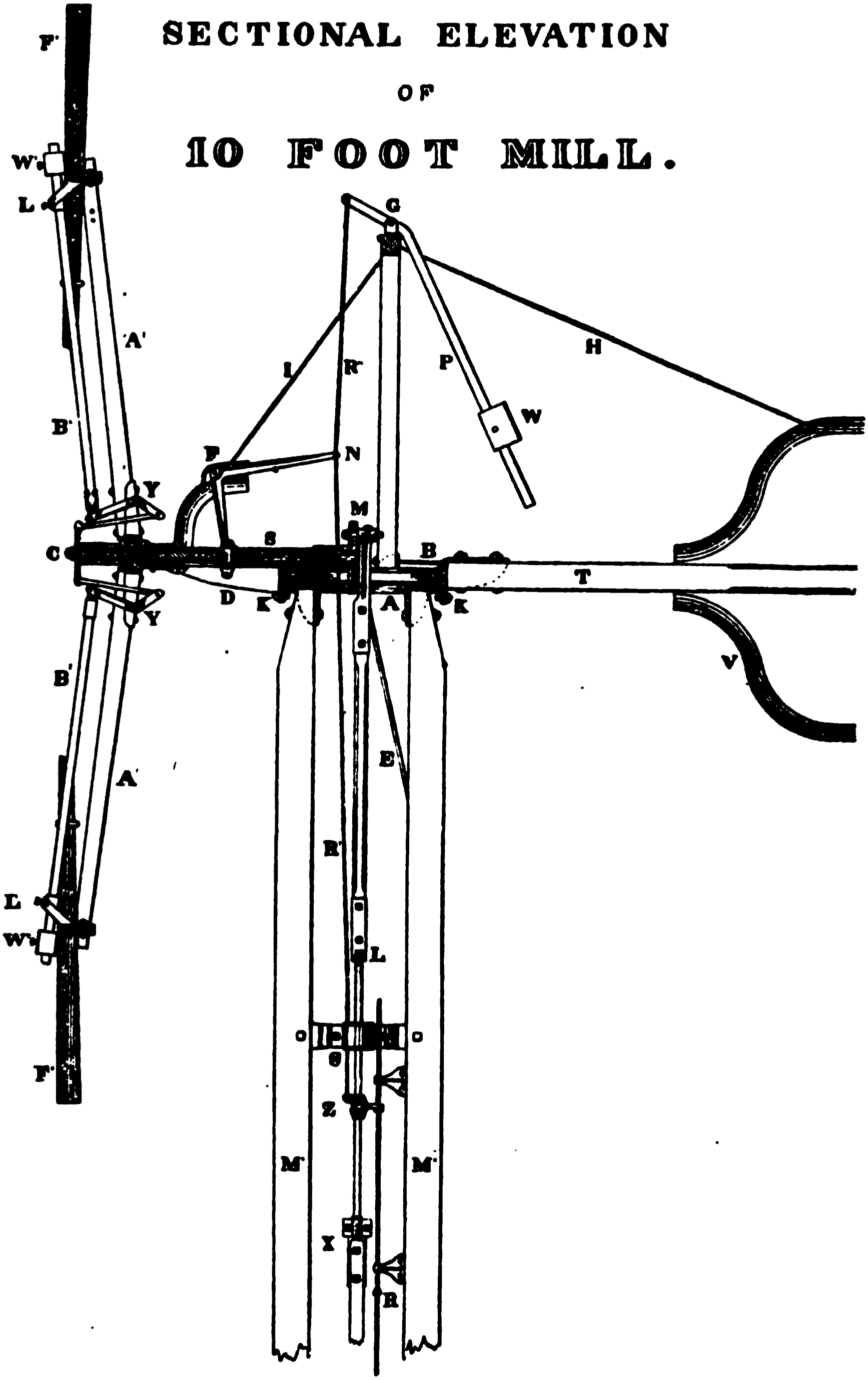


Fig. 1. Halladay Wind Engines.

The inner end of each elbow is connected to the front plate *C* by means of links, the connections from the outer ends to the sails being made by regulating rods *B*. On the outer ends of the regulating rods are governing balls called "regulating weights," marked *W*, the action of which is the same as a governor on a steam-engine, causing the sails to present less surface to the wind as its velocity increases. The weight *W* on the lever *P* has a direct action on the lever *N*, which is fulcrumed at *F* and attaches to the sliding collar at *D*, thus virtually having a direct connection with each sail in the wind-wheel, *F′* representing an edge view of the sails. This weight *W* acts in opposition to the regulating weights, causing the sails to present more surface as the power of the wind lessens, thus, as is claimed, making the mill storm-defying, and enabling it to obtain a uniform motion in all the varying velocities of the wind. The sails may be furled and the mill stopped and made to stand still by pulling down on the shut-off rod *R*, an ordinary hand-lever being used for this purpose. It will be seen that the regulating gear is very simple, securing a direct connection with each sail, and direct action of the regulating weights on the sliding head and its connections, thereby giving positive motion to all the parts; and as these parts are only acted upon when the wind is so strong as to have a tendency to run the mill faster than its maximum speed, the wear is very light upon them.

The pump used in the test is manufactured by the said company, and is known as the "Union Top Force Pump," and is made of brass, the barrel of which is three and three quarter inches in diameter, and the stroke six inches, the pump being a single-acting "lift and force.". The discharge or stand-pipe is provided with a large air-chamber, formed of tubing, to insure a more constant and uniform flow of water.

The derrick, which supports the engine proper and pump, is made ornamental and in a manner to give the appearance of great strength. The four vertical posts are made L-shaped by securing two boards together in the form of angle iron. These are united at the top, and support a square platform formed of slatted work, and the derrick is suitably braced by batter boards and cross ties in the usual manner.

Price of mill, without derrick and pump, one hundred dollars.

NOTE.—This mill, while commonly known and sold as a ten-foot mill, is four inches greater in diameter, and thereby gives nearly four square feet more wind surface than the other mills in the test, which are within the ten feet diameter; and in referring to the data giving the water pumped, this point is to be remembered, particularly as the additional surface is located upon the outer periphery of the wheel, and thereby obtains a greater advantage of leverage.

LEFFEL WIND ENGINE.

This mill was exhibited by the Springfield Machine Company, of Springfield, Ohio.

The wheel is ten feet in diameter, and is formed entirely of wrought-iron, as hereinafter more fully specified. The diameter of turn-table for wheel and vane is six inches; the sweep from the center of turn-table to end of vane is nine feet; the weight of wheel, vane, and iron-work, exclusive of pump and pump rod, is five hundred pounds. The general construction of this mill is fairly shown in the accompanying illustration, which is a side elevation.

The buckets of this mill are designed with an object to get the full power of the wind without clogging or breaking its force on the inside edge of the bucket, as it travels at nearly the same rate of speed as the outer edge.

The buckets are about three feet long by two feet wide, and made of No. 24 sheet-iron, fastened securely to curved iron ribs, and bolted firmly to a set of one and one eighth by five sixteenths iron arms. The arms are bolted to a malleable cone and spider hub; the cone hub comes back over a sixteen-inch Babbitt box, and is balanced to run perfectly free and easy, and without unnecessary friction. It is simply but durably braced, and, as the wheel has a double set of arms, connected at the ends, it forms a double brace of itself.

This wheel is mounted on a malleable iron turn-table, which is perfectly balanced by means of anti-friction wheels, and supported upon washers, and is thus enabled to govern itself at all times and with great ease. This turn-table fits accurately into the bed-plate, which is also made of malleable iron. The crank is made from patent cold-rolled shafting, one inch and one quarter in diameter, and the cone, spider, and crank are attached to it by means of hardened steel set screws, which are held fast by case-hardened lock nuts, and the whole is provided with a sixteen-inch bearing, which is Babbitted from one end to the other. The governor arm is made of heavy wrought-iron, riveted to a malleable iron hinge, and is provided with an adjustable balance weight, which can be raised or lowered according to the amount of work required of the engine. The vane hinge is also made of heavy malleable iron, and is provided with large rubber cushions, which

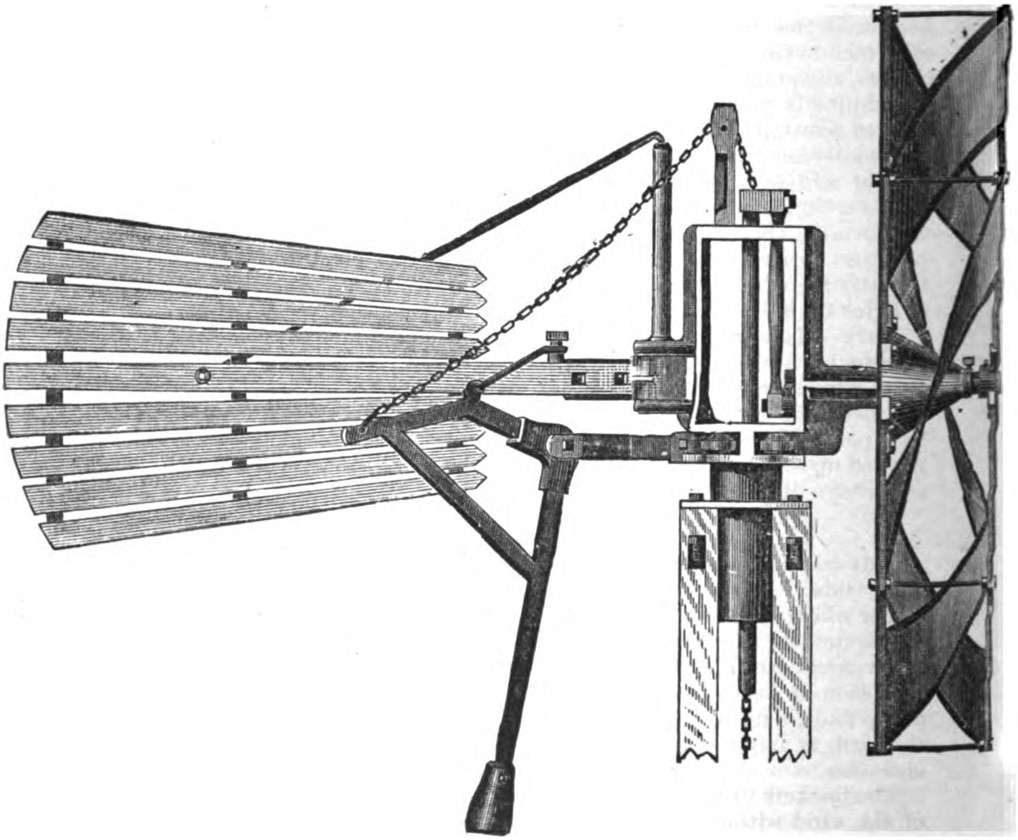


Fig. 2. The Leffel Wind Engine.

prevent sudden jars in heavy gales. The wheel being made entirely of metal, it is adapted for use in any climate, as it is not affected by either dry or moist changes. The crank operates a vertically reciprocating hollow section, which actuates the pump rod, and extends through the vertical pivot bearing of the turn-table, by which it is guided. The pump rod is connected with this section by a swivel joint, to allow the turn-table, etc., to turn without turning the pump rod. A chain connects with the governor arm, and passes over a pulley at the top, and extends down through the hollow section of the pump rod, and is coupled with a lever at the bottom, by which the mill may be thrown into or out of the wind, as desired, and yet it in nowise interferes with the normal automatic working and governing of the mill under the varying velocity and direction of the wind. The wheel-shaft bearing is provided with a self-oiling cup.

The pump used on this mill is what is known as the Leffel Anti-Freezing Wind-mill Force Pump, and consists of a brass cylinder three inches in diameter, with a stroke of four inches, (though the pump is capable of six-inch stroke.)

The cylinder is provided with an air-chamber formed of a pipe, upon which a standard is secured, to which a handle or lever is pivoted, and by which the pump may be worked by hand in case there is not sufficient wind to drive the mill. The pump is provided with a waste aperture, to allow the discharge pipe to empty itself when the mill is out of action.

The derrick upon which the engine proper and pump are supported, consists of four posts four by six inches in section, arranged to meet at top, extending six feet above a square platform six feet square, being slightly curved, and securely braced by the batter-boards and cross braces. The tops of these posts inclose the turn-table base plate vertical bearing, and receive the turn-table plate upon their ends.

Price of this mill, exclusive of derrick and pump, eighty-five dollars.

PERKINS WIND ENGINE.

This mill is manufactured by the Perkins Wind-mill and Ax Company, of Mishawaka, Ind., and was exhibited by A. L. Jones, No. 114 North Sixth street, Philadelphia.

The diameter of the wheel is ten feet, and it is known as a rosette or solid wheel, being formed of wood throughout, with the exception of the tie rods used to prevent injury to the wheel proper by the force of the wind, and which tie rods are common to most wooden wheels of this character. The diameter of turn-table is four inches. The sweep from the center of turn-table to end of vane is ten feet. The weight of wheel, vane, and iron-work, exclusive of pump and pump rod, is four hundred and fifteen pounds.

This accompanying illustration will give an idea of the general construction, though on too small a scale to give a satisfactory illustrative view of the working parts of the mill.

The mill has but two main points of friction; one is the main shaft on which the wheel is fastened to operate the machinery, and the other is the crank which moves the pitman up and down to accomplish the pumping. The vane is hung by hinges on one side of the turn-table, and the wheel upon the other side, they being arranged out of line.

When the wind blows stronger than the wheel is intended to normally bear, the tendency is to fold the vane and wheel toward each other, making them tend to lie parallel, and this action causes the vane to be slightly raised, owing to the bearings of the hinge being set obliquely to a vertical line, and the weight of the vane itself acts as the governor to automatically throw the wheel into the wind again when the wind velocity is sufficiently reduced. There is a proper amount of speed for the wheel which it receives in ordinary winds, but in storms, when the wheel would run too fast if it stood directly in the wind, it turns itself partly out of the wind and keeps its proper motion. If the wind become very severe, the wheel and vane will gently fold together as above described, and remain folded until a reduction in the wind pressure is felt. The pitman and lever are so constructed that the plunger in the pump rises slow and falls fast, which action is designed to relieve the pump of much strain common to other mills. The wheel is moved nearly two thirds around in raising the plunger, thereby giving it great power, and requiring a much lighter wind to pump water than if a semi-revolution were only required to raise the plunger. As the wheel is thrown out of the wind, the vane presses upon a brake rod, and applies a brake to a ring on the rear of the two wheels, thus tending to stop its rotation quickly, and a chain and spring prevent the vane from swinging around in the opposite direction too far.

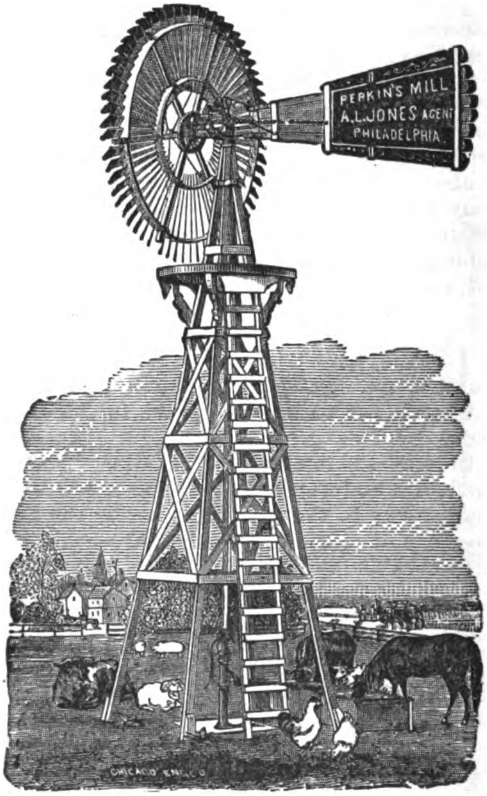


Fig. 8. Perkins Wind Engine.

The crank shaft is provided with a solid crank forged thereon, and is held in a long bearing on one side and a short bearing on the other, and the said crank is connected to a pivoted lever arm by a link near its fulcrum, the end of said lever arm being connected to a hollow pump-rod section, which passes down through the vertical turn-table bearing and connects by means of a swivel joint with the wooden pump rod. The said vertical bearing is supported and kept in position at the top by the turn-table proper, and at the bottom by a ring held in position by bolts secured to the derrick.

A chain connects with the vane, and after being guided over two pulleys, passes down through the hollow pump-rod section, and is connected to the lever used to throw the mill into and out of action when desired, by causing the vane to fold up parallel with the wheel. The vane is formed of slatted wood-work, and provided with wrought iron hinges.

The pump used on this mill is what is known as the Champion force pump, the diameter of the main cylinder of pump being three inches, and stroke four and one half inches, (though the pump is capable of six inch stroke.)

The pump is made double-acting in discharge by the use of two pistons, of different diameters, attached to the same pump rod, and having a discharge port between them. The piston rod is made hollow, and forms the air-chamber of the pump, and, in connection with the double pistons, keeps a continuous flow of water. The pump is also provided with a vacuum-chamber, which keeps up a continuous flow of water in the suction pipe, both during the up and down stroke of the pistons.

The derrick, which supports the engine proper and pump, is formed of four posts substantially square in cross section, which unite about six feet above an octagonal platform near the top, and support the turn-table, etc., on their tops. The posts are slightly sprung or curved inwardly, giving a graceful appearance, as well as one of stability, and these posts are braced by the usual batter-boards and cross-ties.

The price of this mill, exclusive of derrick and pump, is seventy-five dollars.

KENNEDY WIND ENGINE.

This mill was exhibited by S. W. Kennedy, 917 Market street, Philadelphia.

The wheel is formed of wood, and of the rosette pattern, and is ten feet in diameter. The diameter of turn-table is ten inches; the sweep from center of turn-table to end of vane is ten feet ten inches; the weight of wheel, vane, and iron-work, exclusive of pump and pump-rod, is four hundred and fifty pounds. A clear idea of the construction of this mill may be had by referring to the accompanying illustration, which represents a perspective view of the engine proper, with part of the wheel broken away.

The bed-plate *A* of the turn-table is supported upon the upper ends of the derrick posts, and is provided with a chilled groove, in which anti-friction chilled iron balls are placed, and upon which the turn-table *B*, having a chilled face, is placed. This turn-table is provided with the main shaft-bearing *D*, and hinge for the vane, and has a downwardly extending hollow tapering portion, *C*, which works at its lower end in a second plate or bearing; and guided vertically through this portion, *C*, is the reciprocating guide, connected at the top by a pitman with the crank wheel *E*, and at the bottom by a ball and socket joint with the pump-rod, which in this mill is made of metal. The vane *G* is hinged on the side of the turn-table opposite to the bearing *D*, and is provided with a stop to prevent its passing beyond a position at right angles to the wheel, and also with a cam lug, which, when the vane is turned so as to throw the mill out of the wind, acts upon a lever furnished with a brake-shoe adapted to press upon the crank wheel *E*, and secured to the said lever by a spring joint. The gov-

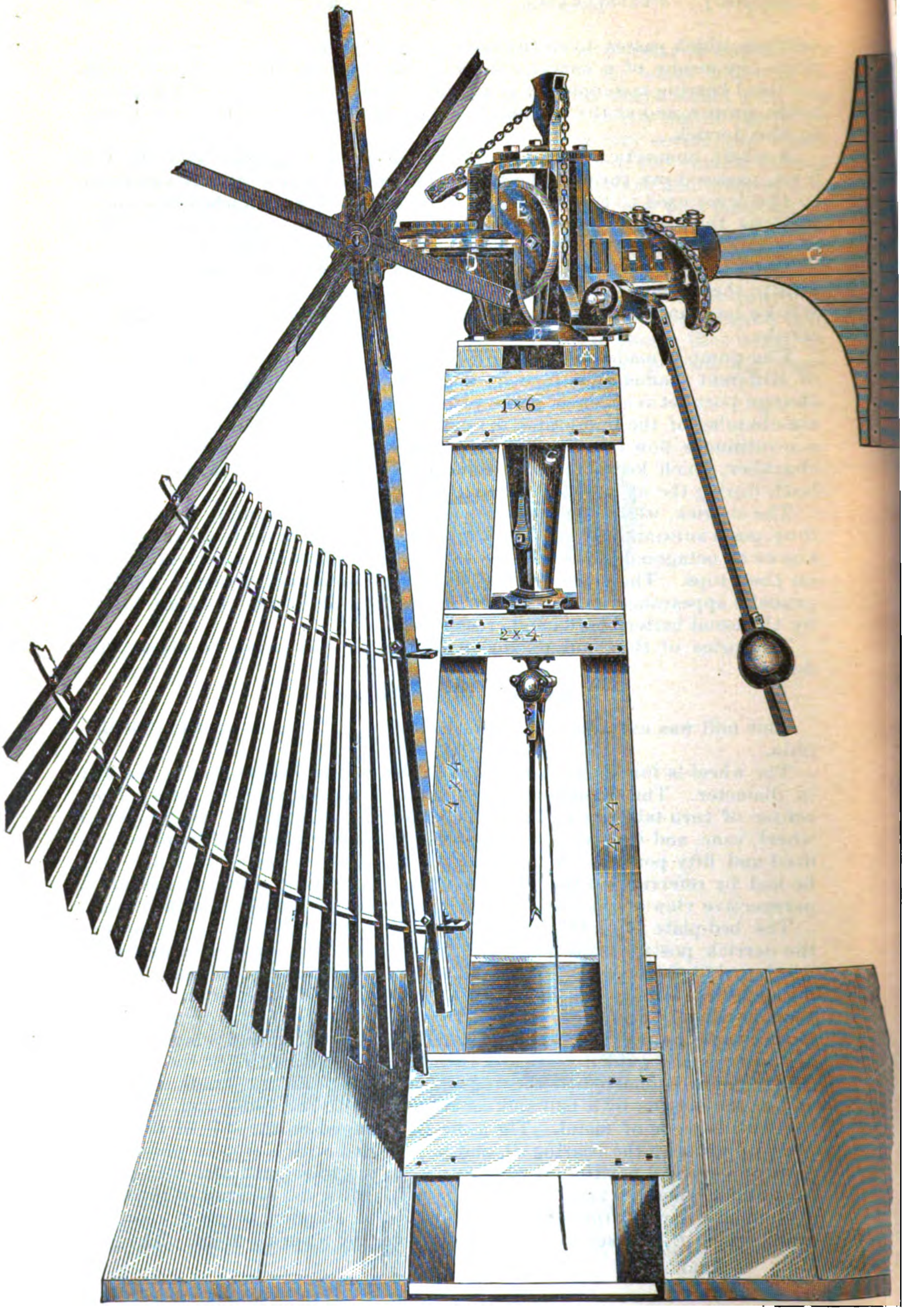


Fig. 4. Kennedy Wind Engine.

ernor *J* is hinged to the turn-table, and is provided with a segment. *I*, over which a chain passes to the vane, so that as the wheel is thrown out of the wind, the vane assumes a position therewith more or less parallel, and causes the governor to be raised or lowered.

Another chain connects on the other side of said vane, and, passing around two pulleys, is conducted down through the reciprocating section in vertical bearing *C*. and connects at the bottom with a lever by which the mill may be thrown in or out of the wind.

The crank wheel is provided with three holes for the crank pin, by which the stroke may be varied to suit the pump and duty required.

The pump used on this mill is a Douglass Double Acting, three inches in diameter, with a stroke of three and three quarter inches. It is brass-lined, with a brass plunger-rod and plunger, and is provided with an air-chamber to insure a more steady stream of water, and lessen the effects of the dead points.

The derrick, upon which the engine proper and pump are supported, is formed of four posts approaching each other at the top, where they support the bed-plate of the turn-table, and these posts are slightly curved, as in the cases of the Perkins and Leffel mills, and strengthened by the usual batter-boards and cross-ties. The platform is arranged about six feet from the top and is made square.

The price of this mill, without derrick and pump, is one hundred dollars.

MANVEL WIND ENGINE.

This mill was exhibited by B. S. Williams & Co., of Kalamazoo, Mich., under the agency of L. M. Bates, No. 243 Arch street, Philadelphia.

The diameter of the wheel of this mill is ten feet; it is formed of wood, and is known as a solid wheel.

The diameter of turn-table is ten inches. The sweep from center of turn-table to end of vane is eleven feet four and one half inches. The weight of wheel, vane, and iron-work, and pump-rod, exclusive of pump, is three hundred and ninety pounds.

The general construction of the mill may be described as follows, reference being had to the accompanying illustrations marked Fig. 5 and Fig. 6.

The working parts to the machine consist only of main shaft and two steel crank pins. *AA* shows the anti-friction turn-table, the parts coming in contact with the balls, as well as the balls themselves, being chilled.

It will be observed that the turn-table is cast on an angle, and that part of the main casting covering the balls not only prevents sleet or ice from interfering with the mill adjusting itself to the changes of the wind, but it is cast in such shape that it is impossible for the main vertical shaft to assume other than a perfectly upright position.

It cannot, even with wear, (which is prevented by using a chill,) get over on one side and throw the wheel out of true, and possibly against the tower. A wind-mill must be sensitive on its axis, especially those termed solid wheel mills, and the one above described seems to be without much friction, yet large and durable.

Fig. 6 shows casting set on the mast; *D* is the wheel casting, *C* is the vane, and *F* the governor hinge, or weight, of varying resistance. When in or out of gear, the position of the above parts is such that the machine is practically evenly balanced. The wheel runs close to the center, and the mast that goes with the mill is convenient if mill has to go on building or placed on any peculiar-shaped tower. The rims, or felloes, of the wheel are interlocked and bolted, and all nuts that fasten arms to the hub, or sections to the arms, are locked. The entire works are housed by an iron shell, and the brake just above *C* throws a shoe against crank wheel, stopping the mill when thrown out of gear.

In operation, this mill, in a strong wind, allows the wheel to swing around to assume a position more or less parallel to the vane, presenting less effective wind surface, and reducing the power of the wheel in accordance with the variation in velocity or force of the wind.

A chain passes from the governor hinge, or lever, over a pulley and down through the hollow pitman, extending to lever close to the ground, by which the mill may be thrown in or out of the wind as desired. The short tubular pitman at the top, working through the turn-table, is connected with the pump-rod by a swivel joint, as is required in all mills.

The pump used on this mill is what is known as the Syphon, and is manufactured by Rumsey & Co., Seneca Falls, N. Y. It consists of a brass cylinder three inches in diameter, and allowing for a stroke of four and five eighth inches. This cylinder is suspended in an iron cylinder, forming a water space around it, into the upper part of which the water is supplied, and the water is sucked up through a valve at the bottom, and lifted by the piston, passing into an air-chamber over the cylinder, from which it flows to the discharge-pipe. The piston-rod passes through the top of the air-chamber and is always well lubricated with water, keeping a tight joint even when the packing lacks oil. The pump is single acting.

The derrick, upon which the engine and pump are supported, is formed of four timbers converging toward the top and terminating in a square platform suitably ornamented, and suitably braced by the usual batter-board and cross-ties. The mast, which supports the engine proper, is placed upon this derrick, passing through the platform and being supported upon cross frames.

The price of this mill, without derrick and pump, is eighty-five dollars.

LOCATION OF MILLS.

The five mills in the contest were located in the north-westerly portion of the fair grounds, and arranged fifty feet apart; the Halladay, Leffel. Perkins, and Kennedy mills being arranged in a direct line south-west and north-east, and the Manvel mill at right angles to and south-east of the Kennedy mill.

All of the mills had a clear unobstructed wind space, being raised forty feet above the ground and entirely clear of all buildings, trees, or structures of any height. The main building was east of the Halladay mill, but was located several hundred feet therefrom, and, during the test, only twice did the wind come from that quarter—during part of Monday, September 23, and Friday, September 26, (see table B.) When from that direction it was with the small velocities of seven and two miles respectively, and the density of the air was light. Thus it is seen that the obstruction, if it can be so called, was insignificant.

The ground was as level as could be expected; the different levels, considering the Halladay mill as zero, were as follows:

Halladay, 0; Leffel, +12 inches; Perkins, —24 inches; Kennedy, —30 inches; Manvel, —30 inches.

The direction of the wind most of the time was such that the air-currents were not required to pass one mill before reaching the next, thus enabling each and all to receive the full effect of whatever air was in motion during the period of trial.

TESTING APPARATUS.

The data it was desired to obtain consisted in the number of revolutions of each mill, and the quantity of water pumped under a given pressure, both in light and heavy winds, and for short and protracted periods, and under varying barometrical changes of the atmosphere.

The speed or number of revolutions of the mill (strokes of the pump) was obtained by speed indicators, worked by a lever pivoted to the reciprocating pump-rod.

The amount of water pumped was obtained by use of the Keystone water meter, manufactured by the Keystone Water Meter Manufacturing Company, (Limited,) corner Front and Laurel streets, Philadelphia.

The meters were carefully tested, before being applied. to insure the accuracy of their registration. They were placed in the return pipe, which returned the water to the wells, so as not to increase the resistance of the pump.

The water was pumped from two large barrels, united by a syphon to increase the water surface, and into one of which barrels the ball and cock connecting with the city mains were placed to compensate for any water lost by evaporation or otherwise, and from the other of which barrels the water was pumped and then returned, after passing through the meter, so that no excessive duty would be demanded of the syphon during a strong wind or gale. The water was forced up a stand-pipe for a distance of twenty-five feet from the fixed level in the tanks, and from a goose-neck it was discharged into a large vessel provided with a float-actuated valve and a screen surface of one square foot of No. 60 wire gauze, to insure a filtration of all water passing to the meter. The float-valve was designed to automatically close the inlet to the pipe communicating with the meter when the level of the water in the tank came within three inches of the valve-seat, so as to prevent the passage of air down said pipe, and the registration of the same by the meter.

By this means, no matter how irregular the pump may be worked, the water will pass through the meter in a solid column, to the exclusion of the air, and thus cause the meter to work under a constant pressure.

The lower portions of the mills were housed in and kept under lock and key, so as to exclude all persons from tampering with the pump or testing-apparatus.

The mills were oiled at the beginning of the test and were not allowed to be oiled or touched until the close thereof, they being closely watched, both day and night, by attendants. The direction of the wind, its velocity, and barometric condition (density) of the air, were accurately taken by the United States Signal officer. with the Government instruments.

TEST.

The tables A and B give all the data taken. with the exception of a few stoppages, in which slight interruptions to the regular working of the apparatus took place, and these were as follows:

TABLE A.

DATE.	HOUR.	HALLADAY.		LEFFEL.		PERKINS.		KENNEDY.		MANVEL.	
		Rev.	Cu. ft.	Rev.	Cu. ft.	Rev.	Cu. ft.	Rev.	Cu. ft.	Rev.	Cu. ft.
September 18,	3.45 P. M.	Speed recorder would not work with vibration of mill.	0	0	0	0	0	0	0	0	0
" 19,	8 A. M.		487	21,820	262	20,340	418	8,100	211	4,750	232
" 19,	6 P. M.		579	22,610	330	22,770	479	8,870	254	6,940	272
" 20,	8 A. M.		651	23,610	491	27,320	541	10,770	275	7,110	316
" 20,	5 P. M.		1,100	35,200	640	35,700	832	20,520	548	24,550	537
" 22,	7 A. M.		1,388	52,060	890	40,420	1,070	25,220	680	34,210	677
" 22,	5.30 P. M.		1,917	67,050	1,154	Speed recorder broke.	1,362	35,840	995	48,010	905
" 23,	7 A. M.		2,044	74,110	1,263		1,438	38,950	1,079	53,520	969
" 23,	5.30 P. M.		2,136	77,720	1,343		1,560	21,190	1,174	58,710	1,038
" 24,	7 A. M.		2,470	90,800	1,546		1,742	Speed recorder broke.	1,507	71,130	1,246
" 24,	5.30 P. M.		3,371	120,540	2,022		2,240		2,095	90,080	1,574
" 25,	7 A. M.		4,261	142,550	2,502		2,771		2,711	104,210	2,018
" 25,	5.30 P. M.		4,899	157,610	2,880		3,203		3,211	133,730	2,378
" 26,	7 A. M.		5,190	162,900	3,146		3,456		3,394	145,310	2,584
" 26,	5.30 P. M.		5,621	171,180	3,426		3,748		3,717	161,460	2,976
" 27,	7 A. M.		5,706	175,930	3,496		3,814		3,793	165,110	3,041
" 27,	4.30 P. M.		5,960	180,750	3,672		3,951		3,976	174,770	3,112

TABLE B.

DATE.	PRESSURE.	WIND VELOCITY.						WIND DIRECTION.						AVERAGE VELOCITY. MILES.	
	Barometer. 7, A. M. 3, P. M.	3, A. M.	7, A. M.	11, A. M.	3, P. M.	7, P. M.	11, P. M.	3, A. M.	7, A. M.	11, A. M.	3, P. M.	7, P. M.	11, P. M.	3, P. M., to 7, A. M.	7, A. M., to 3, P. M.
September 18,	29.869	1	14	20	16	10	16	W.	N. W.	N. W.	N.	N. W.	N. W.		
" 19,	30.271 30.239	1	12	4	5		4	N. W.	W.	N. E.	W.	Calm.	S.	11	7
" 20,	31.850 30.051	11	4	16	8	13	11	S. W.	S. W.	S.	N. W.	N. W.	N.	4.80	9.33
" 21,	30.293 30.218	6	8	6	6	3	6	N. W.	N.	N. E.	S. E.	W.	S.	9.20	6.66
" 22,	30.155 29.994	6	2	15	6	6	10	S.	S.	S.	S.	W.	S.	4.60	7.66
" 23,	30.019 30.012	6	6	9	4	9	7	S.	S.	N. E.	S. E.	N. E.	E.	6.80	6.33
" 24,	30.132 30.092	9	6	14	12	10	9	N. E.	S.	S.	S.	S.	S.	7.00	10.66
" 25,	30.111 30.108	10	12	20	12	11	12	S.	S.	S. W.	N. W.	N.	N.	10 60	14.66
" 26,	30.389 30.262	7	16	18	9	10	2	N.	N.	N. E.	N. E.	N. E.	E.	11.60	14.83
" 27,	30.346 30.168	4	4	6	11	6	9	N. E.	N. E.	S.	S.	S.	S.	5.80	7.00

TABLE D.

DATE.	Name.	Minutes out of service.	Cause.	Approximate water lost.
September. 20, 1.20, A. M., . .	Halladay, .	18	Stoppage at meter, ...	None.
20, 9.55, A. M., . .	Manvel, . .	7	" " "	Quart.
22, 10, P. M., . . .	Kennedy, .	30	Upper tank ball-float broke off, . . .	Two cubic feet.
23, 10.10, A. M., .	"	10	To add repairs to ball-float, ...	None; wind very slight
24, 9.55, A. M., . .	Manvel, . .	10	Chip in meter, ...	One cubic foot.
24, 3.50, P. M., . .	Perkins, . .	8	Ball-float broke, ...	Quart.
25, 1.50, A. M., .	Halladay, .	30	" "	One cubic foot.
25, 10.30, P. M. .	"	10	Scale from pipe in meter, ...	One cubic foot.
26, 8, A. M., . . .	Kennedy, .	40	Ball-float broke, ...	Quart.
26, 12.40, M., . . .	Manvel, . .	20	" "	Quart.

The ball float-valves, arranged in the tank at top of return-pipe, were made to insure the prevention of air passing through the meters, and, when designed, it was not thought that they would be subjected to such a strain as practice has proved them to have been. The breakages noted were where the brass arm holding the float broke, allowing the valve to shut down tightly, and the tank to overflow, until the valve was raised and the ball-float once more attached. The same weakness showed itself in nearly all the mills.

The breakages in the speed recorders were due to the fact that the American Meter Company, who made them, used narrow brass pawls to work the ratchet wheels in use on the mills. Where much vibration in the pump-rod was experienced, the strains and friction were so great as to wear the pawls down, and render them unfit for further duty. The recorders being securely inclosed within a soldered case, it was impossible to repair them. The enormous pump used on the Halladay mill caused so great a vibration that it broke two recorders before a run of ten hours could be had, hence, in table A, it will be noted that no speeds are given for this mill.

Referring to table A, we see that when the wind ranged between twelve and sixteen miles' velocity, and the barometer stood at 29.973, Thursday night, September 18, that the speed of the mills was not nearly so great as when, with an average velocity of wind of about nine miles an hour, the barometer stood at 30.132, showing that the density of the air, as well as the velocity, plays an important part in the available duty of a mill. The relative speeds of the mills may be seen by the record of September 20, at 5, P. M., table A, in which we see that during a run from Thursday, at 3.45, P. M., the Leffel made 35,200 revolutions; the Perkins, 35,700; the Kennedy, 20,520, and Manvel, 24,550, showing a great difference between speeds.

Comparing three of these mills on September 23, at 5.30, P. M., we find them as follows: Leffel, 77,720; Kennedy, 51,190, and Manvel, 58,710; showing the Kennedy and Manvel wheels to be gradually losing ground in velocity. Again, comparing the Leffel and Manvel velocities, after the full test, we have: Leffel, 180,750, and Manvel, 174,770, showing a gain by the

Manvel on the Leffel, from Tuesday, September 13, at 5.30, P. M., to Saturday, September 27, at 4.30, P. M., of 13,030 revolutions.

The Leffel and Manvel mills ran throughout the entire test without noise or vibration, while in case of the others there was considerable vibration, particularly in the Halladay mill, in strong winds, owing to the large pump employed, and it having its governor doubly weighted so as to keep the wheel open as long as possible in an increasing velocity of wind.

The following table, C, of selections from tables A and B, will give a general idea as to how the various mills ran under different velocities of wind, and shows that the Halladay and Kennedy, between September 19, at 3. P. M., and the 20th, at 7, A. M., when the wind velocity was between four and five miles, except a spurt at 3, A. M., when it attained eleven miles, did not do as much work as the Leffel, which had a pump offering much less resistance. In fact, it will be noted that there is much variation in the performance of the different mills, which is, apparently, contrary to any rule. One day it will be seen that one mill will accomplish much more work than another, and the next day the state of things will be reversed.

The total number of cubic feet pumped by each mill is shown at bottom of table A, and the amount pumped for any shorter period can be ascertained by referring to any line above corresponding to the time.

TABLE C.

DATE, (day or night.)	Average wind velocity.	Halladay.	Leffel.	Perkins.	Kennedy	Manvel.
	Miles.					
September 18 to 19,	11	487	262	418	211	232
" 20 to 22,*	7	529	264	292	315	228
" 19 to 20,	4.80	72	161	62	71	44
" 23 to 24,	7	334	203	242	333	208
" 25,	14.66	638	378	432	500	360
" 25 to 26,	11.60	291	266	253	183	202

The line marked with * gives the quantity of water pumped from Saturday evening, at 5, P. M., to Monday, at 7, A. M., with an average velocity of seven miles.

It is not the office of this report to criticise the construction or particular workings of the various mills, it simply being intended to deduce data and tabulate it in a convenient form for a reference and comparison of the duty of each mill, and at the same time make note of anything of particular interest or importance relative to the mills; therefore, I submit the foregoing as my report upon the tests as far as it could be made in view of the troubles experienced in the testing apparatus.

R. M. HUNTER,
Superintendent of Wind-Engine Test.

We, the judges upon the test, accept and sanction the foregoing report over our signatures.

CHARLES W. ERVIEN,
STEPHEN A. MORSE,
JOHN G. BAKER,
Judges.

The PRESIDENT. If there is nothing further before the Board, we will proceed to other business.

Dr. KENNEDY. Mr. President, the report of the chemist, according to the action of this Society, may be made either to the Committee of Publication, or to the Executive Committee. The object of that action, I suppose, was to get it before the public as soon as possible, and I propose to present it here.

ANALYSES OF THE MILK OF PRIZE COWS.

Winners at the Exhibition held in Philadelphia, September, 1884.

To the President and Members of the Pennsylvania State Agricultural Society:

GENTLEMEN: At the exhibition of the Society held in Philadelphia in 1880, analyses of the milk of cows of five of the principal breeds of cattle were made under the direction of the undersigned.

The results, as tabulated in his report, created much interest, as well among the general agricultural public, as among the owners of the cattle tested, and other exhibitors at the fair of that year. This interest was manifested not only by the publicity given to the report by the agricultural press, but also by the varied opinions expressed by writers upon the value of such analyses, and the milk which should be taken when a comparison of breeds is the object desired. Some of the writers appeared to be unmindful of the fact that from the nature of the case the test could be applied only to the milk of animals on exhibition, while others contended that the analyses should be more elaborate, and include one or more proximate principles in addition to the butter fat and casein, to which the inquiry had been confined.

But the object of the researches undertaken by an agricultural society should be, at least for the present, directed to the exact determination of the percentages of those bodies only which go to make up the chief products of the dairy, cheese and butter, leaving the questions of the proportion and nutritive value of the other constituents of milk to future research.

Accordingly, the examinations of the undersigned were, at the fair of 1884, confined, as in 1880, to the determining quantitatively of the cardinal proximate principles named above.

Instead, however, of seeking, as formerly, to take as the standard of each breed the milk of the cow of that breed which had won the highest prize, the milk of more than one prize cow in each breed was taken when practicable. The names of the animals, and the full addresses of their owners, are appended to the table of analyses.

The undersigned, agreeably to the arrangement which had proved satisfactory on the previous occasion, associated with him Mr. Isaac M. Simonin as chemical expert, who gave the examinations due attention until they were completed. They were begun immediately after the milking. They were conducted according to the best methods and with scrupulous regard to accuracy. The results are presented as fully entitled to confidence. As in 1880, each cow was milked by the regular attendant, the entire evening milk was weighed, stirred to render it homogeneous, and a portion taken; this was mingled with an equal portion from another prize cow of the same breed, and the mixture at once subjected to analysis.

The following table of results has been prepared for publication by Mr, Simonin:

NAME OF BREED.	Specific gravity.	Percentage of fat.	Percentage of casein.
I. Devon,	1.0288	4.43	3.864
II. Holstein,	1.0278	4.92	3.517
III. Ayrshire,	1.0275	4.154	3.728
IV. Jersey,	1.0267	5.238	3.171
V. Guernsey,	1.0254	5.114	3.234

I. Milk of cow "Starlight," five years old, owned by J. B. Longnecker, Union Deposit, Pa., first premium, and of cow "Rose of Baltimore, 5th," ten years old, owned by William Jones, South Montrose, Pa.

II. Milk of cow "Vogeltie," five years old, calved February 6, first premium, owned by Roberts, Durnall & Hicks, and cow "Tjilling 2d," two years old, calved February 10, first premium, same owners.

III. Milk of cow "Violet 2d," four years old, second premium, owned by William Fairweather, McLean, Pa., and of cow "Vinnie," eight years old, second premium, owned by William Lindsay, Elizabeth, N. J.

IV. Milk from cow "Sturdy Dame," three years, second premium, owned by Joshua W. Lippincott, Philadelphia.*

V. Milk from "Lady Emily Foley," seven years three months old, calved February, 1884, first premium, owned by Henry Palmer, Avondale, Pa., and cow "Lady Ovit," three years old, first premium, owned by A. J. Cassatt, Berwyn, Pa.

The following is the order in which the breeds stand according to the above table: Specific gravity—first, Devons; second, Holsteins; third, Ayrshires: fourth, Jerseys; fifth, Guernseys. Taken alone, the density of milk affords but a loose approximation to its value, for, while in general, the greater the amount of solid matter, the higher the density; on the other hand, the larger the quantity of butter fat, the less the specific gravity. For cheese—first, Devons; second, Ayrshires; third, Holsteins; fourth, Guernseys; fifth, Jerseys. For butter—first, Jerseys; second, Guernseys; third, Holsteins; fourth, Devons; fifth, Ayrshires.

Although any attempt to draw final conclusions from the experiments made at only two exhibitions would be premature, yet a comparison between them will not be destitute of interest.

	1880.		*1884.*	
Specific gravity—highest,	Devons, Ayrshires,	1.027 1.027	Devons,	1.0288
lowest,	Jerseys,	1.025	Guernseys,	1.0254
For cheese—highest,	Guernseys,	3.723	Devons,	3.864
lowest,	Ayrshires,	2.656	Jerseys,	3.171
For butter—highest,	Devons,	5.57	Jerseys,	5.238
lowest,	Ayrshires,	3.803	Ayrshires,	4.154

ALFRED L. KENNEDY, M. D.,
Chemist and Geologist.

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*Application for the milk of prize winners belonging to other exhibitors in this breed was refused by their dairymen in charge.

Dr. **KENNEDY**. Permit me to add, Mr. President, that in the report just read, we have not disregarded the criticism made on our former report, viz: That however perfect a cow may be as a type of a breed, the milk of one cow can scarcely be considered as sufficient indication of the character of the milk of her breed. That even if we take the milk of a cow of a breed, the cow winning the first premium, that the milk of that cow is not, in the judgment of some writers, a full and complete type of the milk of the breed.

Now, in order to remove the cause of these criticisms, we took the milk of the first and second prize cow, as far as we could get it. The milk was drawn by the attendant of the animal, generally under the inspection of the owner or exhibitor. Then we mingled with that of the first prize cow of the breed that of the second prize cow of that breed, and from this mixture a quantity was taken for analysis, of course being first thoroughly stirred. A suggestion was made that we take the milk of all the cows of a breed on exhibition; but gentlemen will see that, if not impracticable, it is not a fairer test than to take the milk of the prize cows.

Colonel **TAGGART**. Did you take the same quantity of milk in each case?

Dr. **KENNEDY**. Yes; the same quantity of milk in each case.

Colonel **TAGGART**. Then I can very easily follow this out. I think you took all the milk of one or two cows.

Dr. **KENNEDY**. I got all the milk, of course, and stirred it, and took a quantity for analysis, after the mixing.

Colonel **TAGGART**. The same quantity from each?

Dr. **KENNEDY**. The same quantity from each; yes, sir.

Colonel **TAGGART**. That is fair.

Dr. **KENNEDY**. It may be interesting for me to note one fact, that in every case of the three heads mentioned—that is, in specific gravity, in the amount of butter, and in the amount of cheese—in every breed there was an increase—that during the four years there has been an improvement in the character of the product in all of the breeds exhibited by our Society.

Colonel **TAGGART**. Your experiments may have been more thorough.

Dr. **KENNEDY**. So far as they went, the most scrupulous care was taken both years, and the results may be relied upon. Butter-makers differ in regard to the value of the specific gravity test, but I think it is a test that is always made; they differ in regard to the value of it, because, as every man sees here, butter fat——

Colonel **TAGGART** (interposing.) The more oil, the less the specific gravity. The more water, the heavier the specific gravity.

Dr. **KENNEDY**. In order to remove the difficulties which arise from postponing the publication of this report until next year, I will probably hand it to one of the agricultural papers, and send a copy of that paper to each member of the Executive Committee. The object of discussing it here is to draw out such men as Colonel Taggart, and have their views, and, perhaps, have the matter perfected more thoroughly than it otherwise can be.

The **PRESIDENT**. Would it be the pleasure of the Board for these reports to go out as a part of the proceedings of the Society?

Colonel **TAGGART**. When will this report be out?

Dr. **KENNEDY**. If in the regular order, not until next year.

Colonel **TAGGART**. I move that the Doctor have permission to publish it.

The motion was seconded by Mr. **HIESTER**, and agreed to.

Dr. **KENNEDY**. I want to show an improvement in the creamometer—what appears to be an improvement, at any rate. The creamometer as used in creameries is merely a glass tube, cylindrical in shape, closed at one end.

At other times they use a glass tube, which is graduated, and they determine the percentage of cream by the number of degrees of this glass tube occupied by the cream. But, as everybody who has experimented with these says they are a great tax on the patience, it takes some time before you can get what you want. Now, the creamometer which I shall exhibit is called a displacement creamometer; and it acts by displacing the cream through the introduction of a heavier liquid than the watery particles of the milk. The cream rises, as everybody here knows, because of the difference in the specific gravities of the watery particles and the fatty particles. If you can increase the density of the watery particles, of course you cause a more rapid rise of the cream. I will show you how it is constructed, and will then explain the principle. You will not understand that this instrument was used in connection with our own experiments just reported. Ours were more complete, this being for a hurried examination, if you can apply that term. Any stand can be used for the purpose. An ordinary lamp-stand, such as is used in a laboratory, will do as well as anything else. (The Doctor then proceeded to arrange the apparatus, and, having completed it, said:) The difference between this tube and the tubes ordinarily employed for this purpose consists, as you will see, in its having a stop-cock below. It is graduated and can be suspended any way you see proper as a burette. This funnel (indicating) can be substituted by any other convenient arrangement. You observe that the object is to introduce the heavy liquid that is used at the bottom. Now you observe that, by putting this funnel in place, (placing it,) I shall be able to illustrate very readily how the displacement creamometer works. This rubber tube (indicating) is attached at the bottom of this glass tube. The plug of the cock is introduced there, (indicating,) and communication is of course kept up between the contents of the funnel. You introduce into this burette, as it is termed, fifty measures of the milk to be examined. This tube is graduated into one hundred divisions. We then introduce here (pointing) the liquid, which is heavier than water. Now, every farmer knows that salt and water are heavy enough to bring up fat out of a liquid, and yet there are substances which, in solution, are heavier than salt, as, for instance, a substance which is made by acting upon lime with muriatic acid, and called chloride of calcium. We have fifty measures here, and we introduce into this funnel a solution of common salt, or the other salt which I have mentioned, or, better, the solution is introduced here first (indicating the funnel); that fills the funnel and rubber tube—this tube up to the stop-cock. We then introduce the fifty measures of milk and turn the cock. The liquid mingles with the watery particles of the milk, and makes them specifically heavier,—very much heavier than they are naturally,—and, therefore, increases the difference between the specific gravity of that milk and the fatty matter. Consequently, that displaces the fatty matter, and hence it is given the name. We have usually enough to make a hundred measures; by thus driving it up, the cream collects at the top much more readily than when allowed to do so spontaneously—by the method used by the creameries. It is hoped that, by using a very concentrated solution, this instrument can be employed at the depot in the city where the milk arrives, and be employed by both parties. In New Jersey, the milk arriving in Camden is inspected to determine the richness of the milk, and also whether it has been tampered with.

I have just one other matter, gentlemen, to trouble you with, and then I shall be done. You are all very well aware of the necessity of changing our agriculture in the Eastern States; and with many persons who are present I presume the proper change is in the direction of fruit. Now the difficulty, of course, that obtains in the direction of fruit is found in the necessity of repelling the attacks of insects; and the plan is now being tested, on the other side of the ocean, of killing insects on fruit trees and vines by applying an insecticide to the root. I presume we may introduce an insecticide in the same way that some introduce medicine—with the food. That is to say, you take a glass of wine and have some medicine in it—and I have seen chalybeate bread which contained a quantity of iron. The experiment in France is to introduce in the fertilizer an insecticide; and they propose to get an insecticide from poisonous plants, including tobacco. But the insecticide which has certainly done the most to arrest the ravages of the phylloxera—which insect, as you very well know, has destroyed a large portion of the vineyards of France—that insecticide is a liquid with which perhaps many of you are familiar, and others not so familiar; and is applied, as I endeavored to tell you in the last volume of our transactions, by a drill. There is a vessel on the drill containing the liquid. A pipe runs down just behind the shoe, and it is regulated pretty much the same as the seed is regulated. It has been so successful in ridding the ground of all pests, that the French government has taken it up; the railroads have also taken it up, and transport the liquid and the machines free; and it is regarded as the only remedy thus far which can be applied to the roots to kill the insects. I have a bottle of it here, so that those not familiar with it may become so by inspection. It is very familiar, I know, to some gentlemen present, as much so as to myself. The liquid they use is a substance that used to be called "sulpho-carbonic acid." It is now called "carbon disulphide," but on the label it is called the "bisulphide of carbon." It is a liquid which is very combustible. Mr. Landreth will probably explain experiments with coal-oil as an insecticide.

Mr. LANDRETH. The gentleman will include that subject.

Dr. KENNEDY. I might add that the introduction is attended with considerable risk. (In illustration, he then lights some of it.) You perceive now we have the odor of burnt brimstone, and this substance is used for the purpose that burnt brimstone is used for—that is, to disinfect.

But I have occupied your attention too long to-night. I am very much obliged to you for your forbearance.

The PRESIDENT. What is the next thing in order?

Mr. LANDRETH. I have used "carbon disulphide," the last few years, very extensively, somewhere upwards of a year, for the purpose of killing weevil in grain or seeds of any kind—taking wheat, for instance, and placing it in an air-tight room, and we accomplish our purpose by the fumes under the grain. You can, by the proper application of the material—and not a very large quantity, either—kill every insect and germ of insect that may be in the grain—wheat, corn, or products of similar sort. Thus I use it upon our peas and beans. It so happens that peas grown in most sections of the United States are subject to the attacks of the weevil, which, in the fly state, alights upon the pod, penetrating it, and into the pea. Taking refuge there for two or three months, until after the pea is thoroughly ripe, it comes out in the larva the following spring, or when there is sufficient heat. By taking these pods of peas or beans, or whatever they may be, and subjecting them to this material, these insects are entirely killed.

Mr. BRANSON. Is it burnt in the room?

Mr. LANDRETH. No, sir; you just let it evaporate.

Mr. HIESTER. By applying this to the root of the tree can you kill such insects as the peach borer?

Dr. KENNEDY. On that I can give no advice—I have no knowledge of any experiments on that subject. All I can state would be a matter of opinion. But I will say the use of sulphur in almost any of its forms is valuable, and perhaps the most valuable means we have of destroying insects. Sulphur can be employed in the way explained here combined with carbon. The substance is cheap, and is made very easily by passing the vapor of sulphur over incandescent charcoal, and it is transported in all the vine-growing districts of France in barrels. But as to the question which has been presented here, I am unable to answer it.

Mr. KELLER. How would it do to wash trees with it?

Dr. KENNEDY. It is too volatile for that. To wash trees, perhaps the best way would be to boil the sulphur with lime, and use it as a wash.

Colonel TAGGART. That would not stay on the outside of anything, (pointing to contents of bottle.)

Dr. KENNEDY. This would not.

The PRESIDENT. Could either gentlemen suggest whether it could be used by stockmen to rid their stock of vermin?

Colonel TAGGART. It would do away with the stock themselves.

The PRESIDENT. I mean by some mixture.

Mr. LANDRETH. It can be confined to the leaf to a considerable extent. I believe it can be used in exterminating grubs, such as those that infect cantaloupes. I think it is quite practicable to use an injection, using a pump, as it were, to be worked by hand, by which the farmer could pass from hill to hill of a watermelon patch, or from grape-vine to grape-vine, at any time, or even go into his corn-field and kill the wire-worm. I think by employing a tube and running it among the leaves a few inches, and injecting a small quantity from the end of the apparatus, that sufficient material could be injected onto the leaves to entirely eradicate such insects for the time being. Of course they might make their appearance after some days, or some weeks, but I believe they could be entirely destroyed at that moment.

Dr. KENNEDY. Such an instrument is in use in France. They began with a hand instrument.

Colonel TAGGART. This no doubt would be fatal to the borer, if you could get it inside of the peach tree.

Dr. KENNEDY. These suggestions can be made use of to advantage just now, and other suggestions may be made hereafter.

Mr. WILHELM. I move that the reports of the committee be received, and that Dr. Kennedy's report be received also, and all entered upon the minutes; and that the Secretary be authorized to print them in pamphlet form for distribution.

The motion was seconded by Mr. MCKEAN, and unanimously agreed to.

Mr. WILHELM. If not out of place in speaking on this subject of destroying insects, I propose to give my experience in destroying the weevil. When I resided in Cornwall, Lebanon county, we had some fifteen or sixteen barns. The weevil became very destructive in those barns. I saw a notice in some agricultural report that Peruvian guano was very destructive to the weevil. I had it applied in the barns, and it drove them out very soon. I had it spread on the timbers, and on the wall-flats in the stone barns, and got rid of the weevil entirely.

Dr. KENNEDY. Ammonia would probably do it.

Colonel TAGGART. Since our last meeting, a very highly esteemed member of this Board has passed away—Daniel O. Gehr. I move you, sir, that a committee be appointed to draft resolutions expressive of the sentiments of this body in regard to his death.

The motion was seconded by Mr. WILHELM, and agreed to.

The **PRESIDENT** appointed as the committee Colonel Taggart, Mr. Mackey, and Mr. Seiler.

Secretary **SEILER**. The Governor, in his message, has seen proper to honor this Society with a little notice, and I move that it be read for the information of the members.

Secretary **McCONKEY**. The extract is taken from the *Evening Telegraph* of January 6, 1885.

"THE STATE AGRICULTURAL SOCIETY NOT A STATE INSTITUTION.

"There ought to be some modifications made in the existing laws relating to that branch of government having in charge agricultural matters. The law which recognizes the State Agricultural Society as in some way connected with the public administration of this subject, by appropriating it annually twenty-two hundred and fifty dollars, should be repealed. Hereafter, there should be but one head of the agricultural interest, to wit: The State Board of Agriculture, to which all appropriations for this interest should be made, and which should have the entire charge of all matters, pertaining to this branch of the public affairs. Notably should the Agricultural Board have the exclusive control of the publication of the agricultural reports. These changes should be made for the obvious reason that the Agricultural Society is a private corporation, conducted with a view to the private profit of its stockholders, most of whom are capitalists and farmers of large wealth, who are principally concerned in the refinements of agriculture, fancy stock-raising, and the development of fleet horses, rather than the practical concerns of every-day farming. Such an institution is well enough in its sphere, and to be commended as a private enterprize; but as the State has a department of its own devoted to this subject, whatever public money is spent for this purpose should be spent through the recognized public channel. By dividing the resources intended for this interest, the State Board is deprived of a part of the means which should legitimately go to its support and the development of its usefulness."

Colonel **TAGGART**. If I knew the Governor's breakfast hour, I would move that this body wait upon him at that hour and make him apologize. (Laughter.)

Mr. **KELLER**. I second it.

Mr. **McKEAN**. Let the band play!

Mr. **BRANSON**. How many shares have you?

Colonel **TAGGART**. I would like to know.

The **PRESIDENT**. Is there any discussion on the report of the Governor? I think it is worthy of some discussion by this Society.

Secretary **SEILER**. I move that the matter be referred to a committee of three to prepare an answer to this statement of the Governor, and that the committee be appointed by the President.

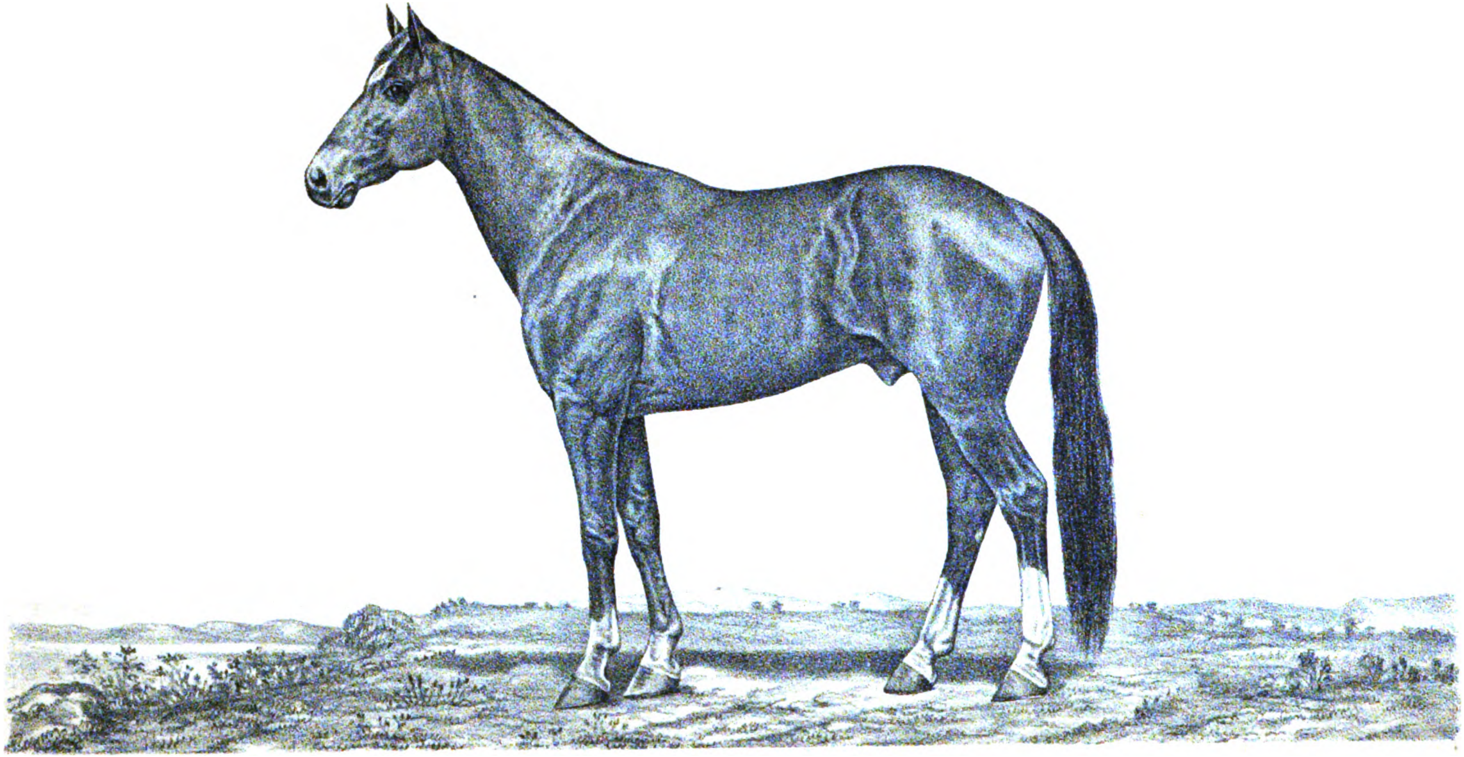
The motion was seconded by Mr. **BARTO**.

Colonel **TAGGART**. If it were not that he had the veto power, I would think it unworthy of notice.

Mr. **MACKEY**. I think it is unfair, and untrue, and beneath the dignity of this body. We dignify it by noticing it.

Secretary **McCONKEY**. I think it is a good motion, for this reason: Let it be referred to the committee, and, after they have thoroughly considered it, they can refer it to this Society to-morrow at its annual meeting.

Mr. **WILHELM**. If the majority will accept a motion or suggestion, it strikes me that courtesy dictates that at least a majority of that committee should consist of members of the State Board who often meet the Governor and are intimate with him. I merely throw this out as a suggestion.



SHAMROCK, 1517.

Owned by R. W. Coleman's Heirs, Speedwell, Pa. From instantaneous photograph by Schreiber & Sons, Philadelphia.

The PRESIDENT. I do not know who are members of the State Board.

Secretary SEILER. Will you increase the number to five?

Mr. BARTO. I think that a very good suggestion. I do not know of any member here who is a member of the State Board, except Mr. Keller.

Mr. KELLER. Mr. Hiester.

Mr. MCCONKEY. And Mr. McDowell.

The PRESIDENT. I would appoint, as that committee, Mr. Landreth, Mr. McDowell, Mr. Branson, Mr. Keller, and Mr. Hiester. I think they are all members of the Executive Committee.

Mr. MACKEY. I understand this committee is to report to the Executive Committee; what action is to be taken in reference to this matter?

The PRESIDENT. That is the understanding.

Mr. SPEER offered the following:

Resolved, That the thanks of this Society are due to Hon. James Donald Cameron, United States Senator from Pennsylvania, one of our members, for obtaining, for our use, from the United States Treasury Department, one of the four complete samples of the wools of the world now obtainable in the United States.

Mr. WILHELM. I think it is due to the honorable Senator that a copy of the resolutions be sent to him by the Secretary.

Colonel TAGGART. That follows as a matter of course.

The PRESIDENT. Shall that be incorporated in the resolution?

Colonel TAGGART. As a matter of course.

The resolution, as amended, was thereupon unanimously adopted.

Secretary SEILER. I have a letter here from Eastburn Reeder, which I will read:

RABBIT RUN FARM, NEW HOPE, BUCKS COUNTY, PA.,
12 Mo., 16, 1884.

D. W. SEILER, *Secretary Pennsylvania State Agricultural Society:*

At a recent meeting of the Solesbury Farmers' Club, I was directed to make inquiry of you when the medals and diplomas awarded the club at the late State fair would be forwarded. The club would also like to have sent them a list of the premiums that were awarded and paid them at the last State fair.

They also desire to have their claim for the Society premiums on wheat, oats, and corn, amounting to one hundred and ten dollars, to be brought before the annual meeting of the Society, and action taken thereon.

Truly yours,
EASTBURN REEDER."

Secretary SEILER. I think there was a Committee on Display of Grains. On that committee, I think, are Messrs. Rhey and McDowell, and I would suggest this matter be referred to that committee for action. If I recollect aright, at the time of making the award, Mr. McDowell and Mr. Rhey came to the conclusion that the display of Mr. Wilson was far superior to that of the Solesbury Club. I think that is the reason.

Mr. MCDOWELL. That was not all of our reason. Our method of examining the grain on exhibition was to take a sample from each bag and make a thorough examination by a glass. Two of the samples were found eaten with weevil, and we thought that very much against the exhibit. I wrote to the gentleman having charge of it—I forgot his name——

Mr. SEILER. Mr. Fells.

Mr. MCDOWELL. I wrote to this gentleman making inquiry, to know whether they were of the last year's growth, and he gave me a letter. with all the signatures, certifying they were. I understand, not from Mr. Landreth, but from some person in charge of his exhibits, that some mischievous person had mixed the seeds, and Mr. Landreth had ejected him from the building, or something of that kind. If these seeds were mixed, we may have done this gentleman injustice. But it is true, as Mr. Seiler remarked, even supposing that the grain was not weevil-eaten in these two sacks, it was so far below the exhibit of that of Mr. Wilson that we would be compromising the character of the Society somewhat in giving the award to the Solesbury Club; and that governed us altogether, for we supposed, after examining these sacks, and particularly these two, under the glass, that this was an old exhibit of wheat, and of course we rejected it on that score. I deem it proper to make this statement before you, that in case any correspondence springs up between our Secretary and the gentleman who had charge of that exhibit, all might know what the action of the Executive Committee was in sustaining the report of the committee, or in making any advance towards compensating them, as they claim they should be. I desire to state that we acted deliberately and carefully, and made the examination as thorough as we possibly could.

We could not discern the injury to the grain by the naked eye, but we did discover that some of the grain was eaten entirely through with small holes, perforated, we supposed, by weevil, and we did not want to give encouragement to exhibits of that kind. We found the seeds of Mr. Wilson were fresh, and so fresh and good that I thought, and Mr. Rhey, too, that to make an award to them would not be just, because the contents of some of the sacks did not indicate vitality like the other exhibits, and there were other objections to it. It did not look, though, like want of preparation. In examining the seeds of Mr. Landreth, I never saw an exhibit in my life that showed the freshness and vigor, or that indicated the freshness of growth of seeds that I saw in his display. I think this Society, in making its awards, ought to look to such exhibits, and see that they are fresh seeds, that they have vitality in them, if we intend to make an award upon them.

I say again, if these seeds had been mixed by a mischievous person, we are deceived by them. But I wanted the Executive Committee to know why we took the action we did. We acted upon the complexion of that grain, and what was presented to us; and we thought we could not sustain the character of this Society by awarding a premium to an inferior article.

Mr. **BRANSON**. As the Solesbury Club have not put in objections in the form of an appeal, I move that the report of the committee be sustained.

The motion was seconded by Colonel **TAGGART**, and agreed to.

Secretary **McCONKEY** read the following:

PHILADELPHIA, *January 14, 1885.*

To the Executive Committee of the Pennsylvania State Agricultural Society:

GENTLEMEN: Burnet Landreth, Esq., chairman of your sub-committee on wind-mills, to whom I addressed a letter of complaint in regard to the "report" of the trial at the fair grounds last September, has advised me to refer the matter to your general committee.

The nature of the so-called "report" bears upon its face evidence of such wide divergence from what was declared should be its import in the original prospectus, that I beg of you, in all truth and sincerity, to have the whole edition recalled.

As there seems to be no material of a practical or scientific value in the report, we are quite willing to waive our interest in it, and will only ask, as a slight compromise, that the money we have paid for printing it be refunded to us.

Very respectfully,
GEORGE CANBY,
"*Representing the United States Wind Engine and Pump Co.*"

Mr. McKEAN. I would just ask if there is any communication from any others?

Secretary SEILER. No, sir; that is the only one.

Mr. McKEAN. Then he has no right to complain.

Mr. KENNEDY. I move that it be laid upon the table.

The motion was seconded and agreed to.

Secretary McCONKEY. Here is a matter I would like to have settled:

REDINGTON, PA., *January 19, 1885.*

SIR: When I made my entries, I entered a herd of Guernseys, but one week later one of my best cows got so lame I could not show a herd, and I wrote to Elbridge McConkey that I could not show a herd, except I could take another one instead; but he did not say anything about it, and so I did not show a herd.

Also, one of my sheep—Hampshire Down—got away, and the dogs got after it, and I could not show a herd of sheep. I wrote, also, about that. This was one week before the fair opened, and I had my entry fees paid. Now, I wish to obtain my entries back because of the above facts—the Guernsey herd and sheep herd—$19. I think it would be right for you to do so. I did not show, and told Elbridge McConkey before the fair opened.

I had, also, first prize on Ayrshire bull over three years, and Mr. Fairweather entered protest and made me second. He had all the privileges over me, and Mr. Lindsay, of Elizabeth, N. J. We were both at New Jersey State fair, &c. Now do what is right, &c.

Yours,
A. S. SHIMER.

Secretary McCONKEY. I would say that he wrote to me about it afterwards, and I said his entry fees had been received and turned over, and I had no power to act in the premises, but would refer it to the Executive Committee.

Secretary SEILER. I make the motion that the money be returned. It is only nineteen dollars.

Mr. WILHELM. Where is the place?

Secretary McCONKEY. In Northampton county.

Mr. NEIMAN. I do not believe he would do anything but what he supposed to be right. I had some conversation with Mr. Shimer. I know some of the facts are as he states, and they are about right as he gives them there.

The motion to refund was seconded and agreed to.

Secretary SEILER. I addressed a reply to him in obedience to what I understood to be the inflexible rule of other societies—not ours alone—that after the entry fee had been paid, then the obligation arises between the two parties to carry out the agreement, and it is a part of the contract. For that reason, I could not take any action until it was referred to you.

Mr. KELLER. That was right. You did the best you could.

The PRESIDENT. It was no fault of Mr. Shimer's that he failed to carry out his part of the contract.

Secretary SEILER. I have a return for rent of grounds, and one from the

Kennel Club of Philadelphia, in regard to a future exhibition, and from Brainerd & Armstrong, which I move be referred to the new Committee on Arrangement.

The motion was seconded and agreed to.

Secretary SEILER. There ought to be some report made of the condition of the Society. Of course, to-morrow, at the annual meeting, the annual report is to be read. At that time, a new Executive Committee will be in office. I think it is proper that the Committee of Arrangement make some report to this committee of about how much money was expended, and the manner of expending it.

Secretary McCONKEY. Before you make that statement, or call that up, would it not be a good idea here to let all the gentlemen know for what purposes the ground is proposed to be rented, and take it up, in detail, for consideration?

Secretary SEILER. That is the reason I wished to refer to the new Committee of Arrangement.

Secretary McCONKEY. It is to rent the ground for combination sales, just as they are held all over the country—Kentucky, and so on; and the question of occupancy would have to be determined by them.

Secretary SEILER. I have made an estimate of the cost of the building, at the time it was turned over, sixty-three thousand seven hundred and fifty dollars. We made a contract, at a later day, for two galleries, one at each end, for two thousand two hundred and fifty dollars. The engine and shafting cost about four thousand dollars, and the grading and other incidentals will amount to enough to make it about seventy-two thousand dollars. We owe Mr. Boyle fourteen thousand three hundred and ten dollars, giving him three notes for that amount of money, which is to be paid at our next exhibition. He also has a due bill for three thousand two hundred and forty-nine dollars, the galleries cost about two thousand three hundred and eighty-nine dollars. We would owe Mr. Boyle nineteen thousand eight hundred and sixty dollars, about two thousand dollars on the engine and shafting, and the other expenses about two thousand dollars. Then, from the Philadelphia and Reading railroad there is due on coupons of admission, about six thousand two hundred and fifty dollars, from which we deduct four thousand seven hundred and fifty dollars, from which we expect to pay Mr. Boyle, three thousand two hundred and fifty dollars, after deducting the interest of one thousand five hundred dollars due to the Reading railroad—interest on loan—which would leave a balance to our credit of one thousand five hundred dollars. Then we would owe Mr. Boyle about seventeen thousand dollars.

When the old Committee of Arrangement were in Philadelphia, the year before last, they made an agreement with the Philadelphia and Reading Railroad Company for a loan of fifty thousand dollars. Then we started operations, made our contracts, and agreed to pay for what was done. One of the conditions of our contract was that this Society should expend ten thousand dollars before we could realize from that loan. After we had met our part of the contract, we were informed that the Reading Railroad Company could not comply with their contract, and could not loan the money to us, because they had gone into receivers' hands. This placed us in an unfortunate position for a while, but, finally, through the kindness of Dr. Paxson, the exertion of the directors, I think, being entirely due to him, they agreed to loan us twenty-five thousand dollars. That tided us over, and we now owe on the buildings about nineteen thousand dollars; which cost us seventy-two thousand dollars; and we owe the Reading Railroad Company twenty-five thousand dollars. We have not paid that off, but the interest. The profits of the fair were but twenty-one thousand dollars over and above the ordinary expenses of the exhibition. When we pay Mr. Boyle this three thousand dollars, and the one thousand five hundred interest, due Reading Railroad Company, we will have paid a little over fifteen thousand dollars out of the profits, and we have paid one half on the engine and shafting, two thousand dollars. We have drained the grounds and ditched them, and, with the other expenses of putting in the engine and shafting, running the expenses up to about twenty-one thousand dollars, which have been paid out of the profits of the exhibition.

Colonel TAGGART. If we do as well next year, it will put us in good shape.

Secretary SEILER. We hope to do better next year.

Mr. NIEMAN. Then you owe upon the grounds about forty thousand dollars?

Secretary SEILER. About forty-one thousand or forty-two thousand dollars.

Colonel TAGGART. When do we pay that?

Secretary SEILER. Our agreement with the railroad is that we pay them all the money over the net profits of the exhibition. We first pay all the expenses of the exhibition, and then any moneys we have left we pay upon the principal.

Colonel TAGGART. Is this forty-one thousand dollars due now?

Secretary SEILER. Yes; it cost us seventy-two thousand dollars, on which we owe now but forty-one thousand dollars. We paid twenty-one thousand dollars of principal from the profits of the exhibition, and ten thousand dollars out of the treasury of this Society, which make thirty-one thousand dollars.

Mr. NIEMAN. The notes of the contractor are not due until the next exhibition, and the loans of the company are paid conditionally.

Colonel TAGGART. So nothing can hurt us now?

Secretary SEILER. No, sir; we are in pretty good shape.

Mr. BARTO. We do not want the bank to strike.

Secretary SEILER. It came pretty nearly striking us.

A MEMBER. Neither do we want the Legislature to strike us.

Secretary SEILER. A violent storm from the west blew in a part of the end of the main building, but did not injure it seriously. The committee arranged with the contractor to erect two galleries of seventy-five feet, which give additional space to exhibitors, brace both ends.

A MEMBER. They have been put in since the last exhibition?

Secretary SEILER. Yes, sir; I would state, also, for the information of the Board, that the Pennsylvania Railroad Company gives us a subscription of two thousand dollars a year for ten years.

Colonel TAGGART. They can afford it.

Secretary SEILER. They have been very liberal to us. We can find no objection there.

Mr. KELLER. More so than the Governor.

Colonel TAGGART. Let us let the Governor alone, now—

The PRESIDENT. And take him up to-morrow.

Mr. NIEMAN. The Governor is president of the State Board, which makes it a rival institution.

The PRESIDENT. We will have to have a resolution passed, but I do not know whether it is necessary now. We ought to have a committee to audit the accounts, and also a committee to conduct the election.

Mr. MACKEY. I move the President appoint the committee to audit the accounts of the Treasurer for the last year, and also appoint tellers to conduct the election to-morrow.

The motion was seconded by Mr. KELLER, and unanimously agreed to.

Whereupon the PRESIDENT appointed as tellers Messrs. Branson, Rutherford, and Keller; and the committee to audit the accounts of the Treasurer, Messrs. Speer, Tripp, and Barto.

Mr. McDOWELL. If there is no other business before the committee—I am sorry that Mr. Rhey, our old friend and co-worker, is not present—

Secretary SEILER. He will be. I had a dispatch to the effect that he will be here on the night train.

Mr. McDOWELL. The matter I wanted to bring up would be reached by renewing a motion that he made at some previous meeting. I, as a member of the State Board, feel attached to it, but I feel more attached to this organization. I cannot say whether it is in the Executive Committee, or among the so-called stock-holders, that the Governor thinks we are, but we cannot do the same work with this organization that is done in the State Board. While their work is theoretical and practical, to some extent, they are still doing a good work, and I do not see any reason why the two bodies should be antagonistic. I cannot see that there is any reason, or cause, even, for it. But there is a defect in this Society, and that is, because we do not lay hold of such subjects as Mr. Rhey brought before us, in regard to getting the statistics of the products of the State. Now, I do think, if the resolution of Mr. Rhey, which was presented at some meeting previous to this, was carried out, and a committee appointed to carry these results to the Legislature for action, as the State Board have their legislative committee. I happen to be on the legislative committee, too. in the preparation of a general road law—such things are not discussed in this body as are discussed in the State Board—and, in addition, I think we ought to have essays. When we come to read or look over what is published in the volumes of our Society, it is remarked that there is very little which appeals to the eye. We ought to have more. We bring our knowledge in, not only through the eye; we ought to disseminate by the tongue and by the pen. In this we are defective. Certainly, there are those in this organization (whether in the Executive Committee or those members, the stock-holders,) who can give us essays upon the art of agriculture; upon the swine, the poultry, the sheep, and the cereal products. Also, upon fruits, upon the various varieties, and upon the trade; also, upon the various subjects that concern the welfare of the whole Commonwealth of Pennsylvania, and not of the people of Pennsylvania alone. We coöperate with other organizations in maintaining the branches pertaining to our organization. I would like to offer a resolution to the effect that the Chair be authorized to appoint at least five persons to read essays at our next annual meeting, or to have them in readiness for the next publication, or at whatever time it may be necessary to have them. About what time should they be on hand, Mr. McConkey?

Secretary McCONKEY. The first of October we ought to have them.

Mr. McDOWELL. I think that will give us a status that we will be able to sustain, and be able to make further headway with. If the Governor has underrated us, I think he has done so from not knowing the workings of this Society, and getting his information from the wrong source. I should, indeed, like the Governor to come to our exhibits and see for himself, not taking his information from hearsay, but letting his own eyes behold the wondrous exhibits that this Society has been making. I, therefore, move that the Chair be authorized to appoint essayists at least five in number, they to select their own subjects, and report the same by the first of October to the officers of this Society.

The motion was seconded by Mr. KELLER.

Mr. WILHELM. I would simply state, for the information of the gentlemen present, that there was a committee appointed to invite to our exhibition President Arthur, the Governor of Pennsylvania, and the candidates for President, including Benjamin F. Butler. I had been appointed the chairman of the committee. I addressed letters to all those gentlemen, and to the candidates for Vice President, and I received very polite replies to all. I addressed letters to the Governor, including one to him while he was in the city of Philadelphia, and asked him to name a day that would be most convenient to himself to visit the State fair, for the purpose of receiving, in the name of the State, a silk flag, to be presented by ladies of the Pennsylvania Silk Growers' Association, as well as to deliver an agricultural address of only twenty minutes. That would not have taxed him very hard. I then paid a personal visit to the Executive Department. He was absent. I went to personal friends in this town on the subject. One finally telegraphed me that the Governor could not attend, and his private secretary informed me that it was owing to a standing appointment that he was subject to be called upon any day to fill. These were the reasons given us, whether valid or not, why he did not attend our exhibition.

Mr. HIESTER. I beg leave to differ a little from Mr. McDowell in his suggestions. I think it would not be well to have this Society do what the State Board is doing. The State Board has been making up the statistics, and doing it in a very thorough manner; and it is having a number of essays read at each of its three meetings each year, which are printed in the same volume as the report of this Society. I think the State Board is doing very great good in this direction. This Society is furnishing an exhibition of the products of the Commonwealth, and in that way doing as good a work as the State Board. Just at the present time, the members of the State Board have no feelings antagonistic to this Society, and no cause for any, because each one is doing its work and doing it well. I think it would be better for this Society to go on doing its own work, and doing it as well as it has done. I fear if we have this Society and the State Board doing the same work, that we will have more or less antagonism. It would be well to consider the matter fully before deciding upon doing what Mr. McDowell proposes.

Mr. McDOWELL. I would be very sorry if my remarks would lead any one to the conclusion referred to. If there is any member of this organization that would try to prevent these two associations becoming antagonistic, I think I am one. I do not suppose that the State Board exhausts all the subjects it takes up—I think the subject of agriculture will never be exhausted. It is as hard to fathom the depths of agriculture as to find out all the ramifications of chemistry. It is a study that will always be a matter of research by scientific men, and we will never reach its lowest depths.

On the motion that a committee of five be appointed as essayists to read essays at the next annual meeting of the Society, or present them for publication by the first of October next year, and have them incorporated in the report,—the essays not being confined to members of the Executive Committee, but to be presented by members of the Society,—the motion was agreed to without a dissenting voice.

The PRESIDENT appointed as the committee, Messrs. McDowell, Branson, Rhey, Hiester, and Taggart.

Mr. McDOWELL. The vote was so meager I would rather have it defeated entirely.

Secretary SEILER. There was no objection.

Mr. HIESTER. Does not the Society offer two or three premiums each year?

Secretary McCONKEY. Yes; more than that.

Secretary SEILER. About six or seven.

Mr. HIESTER. It was my recollection that the Society offers premiums on stated subjects. I have read several prize essays in old reports.

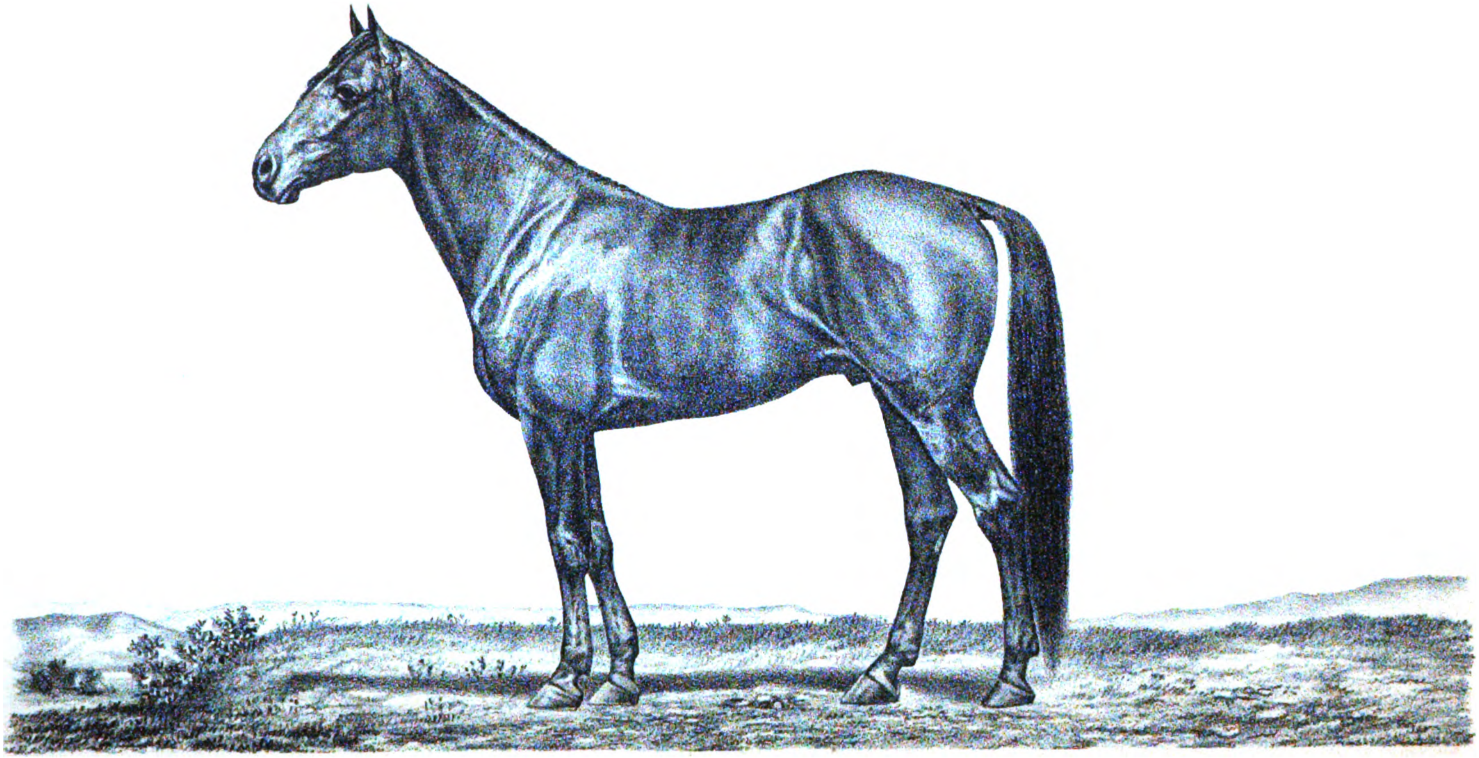
Secretary McCONKEY. It offers eight or ten, including a premium for the best report of the exhibition.

Mr. McDOWELL. I have brought with me a sample of petroleum, obtained by sinking a well near the little town of Washington, from whence I come, that members here may look at as a further development of the resources of our great county of Washington.

The PRESIDENT. Made great by its fine wool sheep.

Upon motion of Mr. MACKEY, it was agreed that when the Executive Committee adjourn, it adjourn to meet at ten o'clock, Wednesday morning, January 21, 1885.

Adjourned.



"HARTFORD," 3574.

Sire "Harold;" dam "Judith," by "Mambrino Chief," owned by R. J. C. Walker, Williamsport, Pa. From instantaneous photograph by Schreiber & Sons, Philadelphia.

III. PROCEEDINGS OF THE SOCIETY.

Wednesday, *January 21, 1885, 10 o'clock*, a. m.

The annual meeting of the Society was called to order, and, on motion, Mr. Neiman was called to the chair.

The polls for election of officers opened.

The following amendment to the constitution, of which notice was given at the September meeting, was offered, and after discussion, adopted:

That, at the annual election of this Society, there shall be elected, from one of the number of Vice Presidents, one of said officers, to act as first Vice President, whose duty it shall be to act as President of this Society, in case of the absence or death of the President.

In case of the death or resignation of any officer of the Society, the President shall have the power to fill the vacancy by appointment, until the next annual meeting of the Society.

The Recording Secretary shall have power to approve such bills and contracts as he is authorized to make, and the Treasurer shall pay the same.

The hour of twelve having arrived, the chairman declared the polls closed, and the judge and tellers reported the result as follows:

We, the undersigned, appointed to conduct the annual election of the Pennsylvania State Agricultural Society, this 21st day of January, A. D. 1885, beg to submit the following report; the whole number of votes cast, seventy-three (73):

President.

A. Wilhelm, York, York county,	73	votes.

Vice Presidents.

1.	George Blight, Philadelphia,	73	votes.
2.	L. H. Twaddell, Philadelphia,	73	"
3.	John Hunter, Philadelphia,	73	"
4.	William M. Singerly, Philadelphia,	73	"
5.	Burnet Landreth, Bristol, Bucks county,	73	"
6.	David H. Branson, Atglen, Chester county,	73	"
7.	William H. Holstein, Bridgeport, Montgomery county,	73	"
8.	Tobias Barto, Reading, Berks county,	73	"
9.	S. S. Spencer, Lancaster, Lancaster county,	73	"
10.	Daniel H. Neiman, Easton, Northampton county,	73	"
11.	D. J. Waller, Bloomsburg, Columbia county,	73	"
12.	Ira Tripp, Scranton, Lackawanna county,	73	"
13.	J. S. Keller, Orwigsburg, Schuylkill county,	73	"
14.	Gabriel Hiester, Estherton, Dauphin county,	73	"
15.	Joseph Piollet, Wysox, Bradford county,	73	"
16.	Robert P. Allen, Williamsport, Lycoming county,	73	"
17.	John A. Lemon, Hollidaysburg, Blair county,	73	"
18.	John S. Miller, Huntingdon, Huntingdon county,	73	"
19.	Daniel O. Gehr, Chambersburg, Franklin county,	73	"
20.	L. A. Mackay, Lock Haven, Clinton county,	73	"

21. George Rhey, Millwood, Westmoreland county,	73 votes.
22. F. V. Clopper, Greensburg, Westmoreland county,	73 “
23. W. W. Speer, Pittsburgh, Allegheny county,	73 “
24. John McDowell, Washington, Washington county,	73 “
25. J. A. McKean, Pittsburgh, Allegheny county,	73 “
26. J. D. Kirkpatrick, North Liberty, Mercer county,	73 “
27. J. C. Thornton, Fairview, Erie county,	73 “

At large.

J. A. Paxson, Philadelphia,	73 votes.

Additional Members Executive Committee.

(By election.)

Abner Rutherford, Paxton, Dauphin county,	73 votes.
William Taylor, Womelsdorf, Berks county,	73 “
John H. Ziegler, Harrisburg, Dauphin county,	73 “
Jefferson Shaner, West Chester, Chester county,	73 “

Ex-Presidents.

Frederick Watts, Carlisle, Cumberland county,	73 votes.
David Taggart, Northumberland, Northumberland county,	73 “
Jacob S. Haldeman, Harrisburg, Dauphin county,	73 “
William S. Bissell, Pittsburgh, Allegheny county,	73 “
James Miles, Girard, Erie county,	73 “

Recording Secretary.

D. W. Seiler, Harrisburg, Dauphin county,	73 votes.

Treasurer.

John B. Rutherford, Harrisburg, Dauphin county,	73 votes.

Corresponding Secretary.

Elbridge McConkey, Harrisburg, Dauphin county,	73 votes.

Chemist and Geologist.

Alfred L. Kennedy, Philadelphia,	73 votes.

Librarian.

William H. Egle, Harrisburg, Dauphin county,	73 votes.

DAVID H. BRANSON,
J. S. KELLER.
ABNER RUTHERFORD.

The auditors appointed to examine the vouchers of the Treasurer reported as follows, which, on motion, was confirmed:

John B. Rutherford, *Treasurer in account with Pennsylvania State Agricultural Society:*

Dr.

1884.			
January	—.	To balance in treasury,	$633 74
Feb.	15.	To Pittsburgh exposition note,	1,584 41
April	9.	To interest on United States bonds,	90 00
"	29.	To proceeds sale $1,000 United States bonds,	1,228 50
June	2.	To proceeds sale $7,000 United States bonds,	8,418 12
"	25.	To proceeds sale $1,000 United States bonds,	1,180 00
Sept.	—.	To cash, single admissions, memberships, and exhibition at Philadelphia,	38,727 86
		Entry fees, exhibitors' tickets, &c.,	2,289 50
		From concessions and other sources,	2,785 03
		Cash from dog show,	2,882 61
		Donation from Pennsylvania Railroad Company,	2,000 00
		Donation from Thirteenth and Fifteenth Street Passenger Railway Company,	200 00
		Life membership, Mr. Jamison,	20 00
		State appropriation,	2,000 00
		Reading railroad tickets on hand,	6,242 50
		Cash from Philadelphia and Reading Railroad Company,	25,000 00
		Balance due the Treasurer,	256 22
			$95,533 49

Cr.

1884.	
By rent of office and grounds, Harrisburg and Philadelphia,	$705 00
By expenses of Executive Committee,	2,637 93
By printing and advertising,	1,679 18
By premiums and medals,	15,256 94
By superintendence, police, watchmen, and labor,	4,279 66
By transportation,	906 76
By hay and feed,	1,774 48
By tents, lights, fuel, and music,	1,579 73
By insurance and Grand Army,	1,068 16
By expense of President's office,	272 35
By expense of Secretary's office,	665 21
By expense of Treasurer's office,	338 00
By preparation of grounds, lumber, &c.,	2,216 86
By permanent improvements, engine, &c.,	4,785 43
By cash paid Doyle on account of buildings,	47,000 00
By postage and expressage,	630 25
By salary of Recording Secretary,	2,000 00
By salary of Corresponding Secretary,	1,000 00
By salary of Treasurer,	500 00
By Reading railroad tickets on hand,	6,242 50
	$95,533 49

The committee appointed to audit the account of the Treasurer report that we have examined the account and find it correct as stated, and a balance due the Treasurer of two hundred and fifty-six dollars and twenty-two cents.

IRA TRIPP,
W. W. SPEER,
TOBIAS BARTO.

Chairman **NIEMAN**, on resigning the chair, addressed the newly-elected President.

In declaring the result of the election, Mr. **NIEMAN** said:

Mr. Wilhelm, it gives me great pleasure to announce your unanimous election to the presidency of this Society. Your long connection with it as an officer, the great interest you have always manifested in its success, and the time you have so cheerfully given in attending to such duties as have been assigned you, assures us that we have no need to fear for the success of your administration.

For myself, personally, permit me to say that this choice of the meeting of the Society is particularly gratifying, as our personal relations have been of long standing, and of the most cordial nature. Permit me again to congratulate you upon your elevation to this important position.

Mr. **PRESIDENT**. I thank you very much for your complimentary remarks in my behalf, as well as the members of the Pennsylvania State Agricultural Society, for the honor conferred. Have always been interested in the interests of agriculture, and the success of this Society, which has done so much to promote the interests of agriculture. True, I have devoted much of my time during the past year with the committee of arrangements, to aid in providing the necessary buildings for our annual exhibition, without an idea of being honored to the position of President of the Society, but coming as it does, unexpected and unsolicited, I accept the compliment, again thank you, and promise to discharge the duties of the office to the best of my ability.

Adjourned to meet at three o'clock, P. M.

D. W. SEILER,
Secretary.

IV. PROCEEDINGS OF EXECUTIVE COMMITTEE.

HARRISBURG, *January 21, 1885, 3 o'clock*, P. M.

The hour of three having arrived, President **WILHELM** called the committee to order, the following members present: Messrs. Landreth, Branson, Barto, Neiman, Tripp, Keller, Hiester, Miller, Black, Mackev, Rhey, Speer, McDowell, McKean, Abner Rutherford, Taylor, Ziegler, Taggart, Miles, McConkey, J. B. Rutherford, Kennedy, Egle, and Seiler.

Dr. **KENNEDY** offered the following resolution:

Resolved, That a committee of five be appointed, to report at the next meeting of this Society, on the direction and extent of coöperation practicable among the agricultural organizations of the State, for the promotion of the common cause—the advancement of agriculture.

Agreed to.

Committee: Messrs. Kennedy, Branson, McDowell, and Seiler.

Dr. **KENNEDY** offered the following resolution, which was agreed to:

Resolved, That a Committee of Publication be appointed for the current year, to have matter ready by first of October.

The **PRESIDENT** appointed, on said committee, Messrs. Kennedy, McConkey, and Seiler.

Mr. **LANDRETH** offered the following:

Resolved, That the Secretary of this Society be authorized to see to the drafting of a bill for the appropriation by the Pennsylvania Legislature of the sum of ten thousand dollars over and above the usual sum—the additional money to meet the extraordinary expenses of the Society incurred in the erection of permanent and spacious buildings at Philadelphia.

Which was agreed to.

Mr. **SEILER** moved that the President appoint a Committee of Arrangements of nine, the President to be chairman thereof, who shall have full power to act for this committee in the management and arrangements for the next exhibition.

Agreed to.

The President appointed Messrs. Blight, Kennedy, Landreth, Paxson, Twaddell, Shaner, McConkey, and Seiler.

Mr. **LANDRETH** offered the following:

Resolved, That the exhibits of this Society hereafter be divided into three grand sections, hereafter named, each being placed under a competent superintendent, with separate office and clerical facilities, under the supervision of the Executive Committee.

1. Soil Products in Primary and Secondary Forms.
   Agricultural Machinery.
   Products of Herd and Flock.
2. Live Stock.
3. Manufactures not Agricultural.

Mr. **MACKEY** moved to refer the above to the Committee of Arrangements.

Agreed to.

Mr. **LANDRETH** also offered the following:

Resolved, That the main building on the grounds be hereafter called "Industrial Hall." That it be arranged for the display of manufactures, not agriculture. That it be placed at the disposal of a Philadelphia organization, with power to organize an industrial display.

Mr. **McCONKEY** moved to refer the above to the Committee of Arrangement.

Agreed to.

Mr. **McDOWELL**. I desire to know if, by this change, the agricultural exhibits will be placed outside the building, and what arrangements will be made for their protection from the weather.

This was answered by suggesting that the two buildings on extreme eastern end of grounds be placed at the disposal of such displays.

The committee appointed to prepare suitable resolutions on the death of Vice President Daniel O. Gher offered the following:

Resolved, That the Society deplores the death of Daniel O. Gher, who was, for twenty years, an active member of our Executive Committee We bear witness to his personal worth, and his official capability, and offer to his family our earnest sympathy.

DAVID TAGGART,
L. A. MACKEY,
D. W. SEILER,
Committee.

Mr. **TAGGART** moved that the thanks of the Society are due to the late President, James Miles, for his active and long services rendered while President.

Agreed to.

Mr. **LANDRETH**. chairman of the committee to make reply to that portion of the Governor's message, which refers to the Society, reported as follows:

OFFICE OF THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY,
HARRISBURG, *January 21, 1885.*

To the Senate and House of Representatives of the General Assembly of Pennsylvania, and the Farmers of the Commonwealth:

At the annual meeting of the Pennsylvania State Agricultural Society, held at Harrisburg, January 20 and 21, 1885, the attention of the members was called to the following extract in reference to the Society, taken from the annual message of Governor Pattison, dated January 6:

> "There ought to be some modifications made in the existing laws relating to that branch of government having in charge agricultural matters. The law recognizing the State Agricultural Society as in some way connected with the public administration of this subject, by appropriating to it annually $2,250, should be repealed. Hereafter, there should be but one head of the agricultural interest, to wit: The State Board of Agriculture, to which all appropriations for this interest should be made, and which should have the entire charge of all matters pertaining to this branch of the public affairs. Notably should the agricultural board have the exclusive control of the publication of the agricultural reports. These changes should be made for the obvious reason that the agricultural society is a private corporation, conducted with a view to the private profit of its stock-holders, most, or many, of whom are capitalists and farmers of large wealth, who are principally concerned in the refinements of agriculture, fancy stock-raising, and the development of fleet horses, rather than the practical concerns of every-day farming. Such an institution is well enough in its sphere, and to be commended as a private enterprise; but as the State has a department of its own devoted to this subject, whatever public money is spent for this purpose should be spent through the recognized public channel. By dividing the resources intended for this interest, the State Board is deprived of a part of the means which should legitimately go to its support and the development of its usefulness."

The Society respectfully begs leave, in the following brief reply, to correct the several misapprehensions of the Governor of the Commonwealth, which otherwise might mislead the public.

AS TO THE STATUS OF THE SOCIETY.

"The Pennsylvania State Agricultural Society" was created a body corporate by an act of Assembly, 29th day of March, 1851. The constitution, adopted soon thereafter, and still in force, provided "that the objects of the Society are to foster and improve agriculture, horticulture, and the domestic and household arts."

Never before since the date of its organization has its status been questioned, and it has had repeated subsequent State legislation confirming its position.

The Society has always been recognized by the United States Department of Agriculture as a State society, with the same claim to representation as the State agricultural societies of other Commonwealths.

The Congress of the United States, by legislation, has recognized the Society as a regular State agricultural society, and the State Department at Washington officially, through our ministers and consuls abroad, proclaimed the International Exhibition of Sheep, Wool, and Woolen Fabrics, held in 1880 under the administration of this Society, and invited the competition of all nations.

The Society is not conducted with a view to the private profit of its stock-holders, as so positively stated in the message of the Executive. It has no stock-holders! It has no stock! Its receipts from all sources go for the advancement of broad agricultural interests, as will be shown. The Society has the full confidence of kindred organizations, which manifest their approval of its work by joining hands with it at its annual fairs. These societies comprise the State Horticultural Society, the State Dairymen's Society, the State Bee-Keepers' Society, the Silk Cultural Society, the Philadelphia Society for the Promotion of Agriculture, the Fruit-

Growers' Society, and other organizations having the true interests of their specialties at heart.

It is not a horse-racing society, as intimated by the Executive. On the contrary, it has in recent years uniformly declared, in its publications and by its acts, that it is committed to the development of legitimate agriculture—pure and simple—no other society in the United States being so scrupulous upon this subject. Its live-stock premiums are offered for the display of thoroughbred stock—the development of which must be recognized as a highly important branch of agriculture, particularly as the more extensive development of stock-breeding seems one of the few resources left to the Pennsylvania farmer, if he is to be placed on an equality with his Western competitor.

The Governor of the Commonwealth suggests the repeal of the pitiful annual appropriation of two thousand two hundred and fifty dollars, ($2,250.)

If such be done, agriculture will suffer a grievous wrong. Seventy-five (75) per cent. of all the taxes collected in the State of Pennsylvania comes out of the pockets of the farmers, and to withdraw from them the official recognition by the State, would be an injustice to the interests in behalf of which the Society was organized.

Any rule which withdraws the appropriation from the State Society necessarily applies to similar organizations throughout the State, and its execution would affect their usefulness.

A brief review of the work of this Society may not be out of place here:

Organized and holding its first exhibition in 1851, it has since, annually, with the exceptions of the years 1861, 1862, 1876, and 1883, conducted a series of most interesting and profitable exhibitions.

The cost of administration of these exhibitions has reached forty thousand dollars ($40,000,) the awards in cash prizes aggregating over one hundred and fifty thousand dollars, ($150,000;) voluntary contributions to the Pennsylvania State Agricultural College, fourteen thousand dollars, ($14,000;) subscription to the Centennial stock, one thousand dollars, ($1,000;) expenditures to the International Wool Exhibition in 1880, ten thousand dollars, ($10,000,) independent of the regular fair of that year; cost of erecting, at various points over the State where the Society has held its annual fairs, buildings at an expense of over one hundred thousand dollars, ($100,000,) which, in many cases, and to the extent of a valuation of quite seventy-five thousand dollars, ($75,000,) it has left behind for the benefit of the local county societies.

The past year this Society erected, on its permanent grounds at Philadelphia, a set of exhibition buildings costing seventy-two thousand dollars, ($72,000,) and which will compare favorably with any other agricultural exhibition buildings in the Union; thus showing a total expenditure of three hundred and eighty-seven thousand dollars, ($387,000.)

The premiums offered out of the receipts have exceeded those offered by any other agricultural society in the United States for pure agricultural exhibits, there being none for horse-racing.

The Society comprises and is controlled by its membership of over eight hundred. The general details of administration are in the hands of a board of vice presidents, representing each and every Congressional district in the State.

The Governor seems to have forgotten that it is both the policy and the pride of democratic forms of government to foster and encourage volunteer organizations which promote public prosperity. Public-spirited citizens have thus the opportunity to unite for the public good, and are recognized, welcomed, and assisted as co-workers. Under despotic rule, on the other hand, voluntary associations of private citizens are discouraged, over-awed, and crushed beneath the iron grasp of centralized power.

We trust we have shown that the Pennsylvania State Agricultural Society is worthy of its name, of its position, and of the patronage of the State, and that Governor Pattison has done great injustice to a long-tried and valuable auxiliary in the work of developing the great and varied agricultural resources of the Commonwealth.

BURNET LANDRETH,
JOHN McDOWELL,
JOHN S. KELLER,
GABRIEL HIESTER,
DAVID H. BRANSON,
Committee.
A. WILHELM,
President.

D. W. SEILER, *Recording Secretary.*
ELBRIDGE McCONKEY, *Corresponding Secretary.*

Which was approved.

Mr. BRANSON presented and read the following report on

CARP CULTURE IN CHESTER AND LANCASTER COUNTIES.

ATGLEN, *January 14, 1884.*

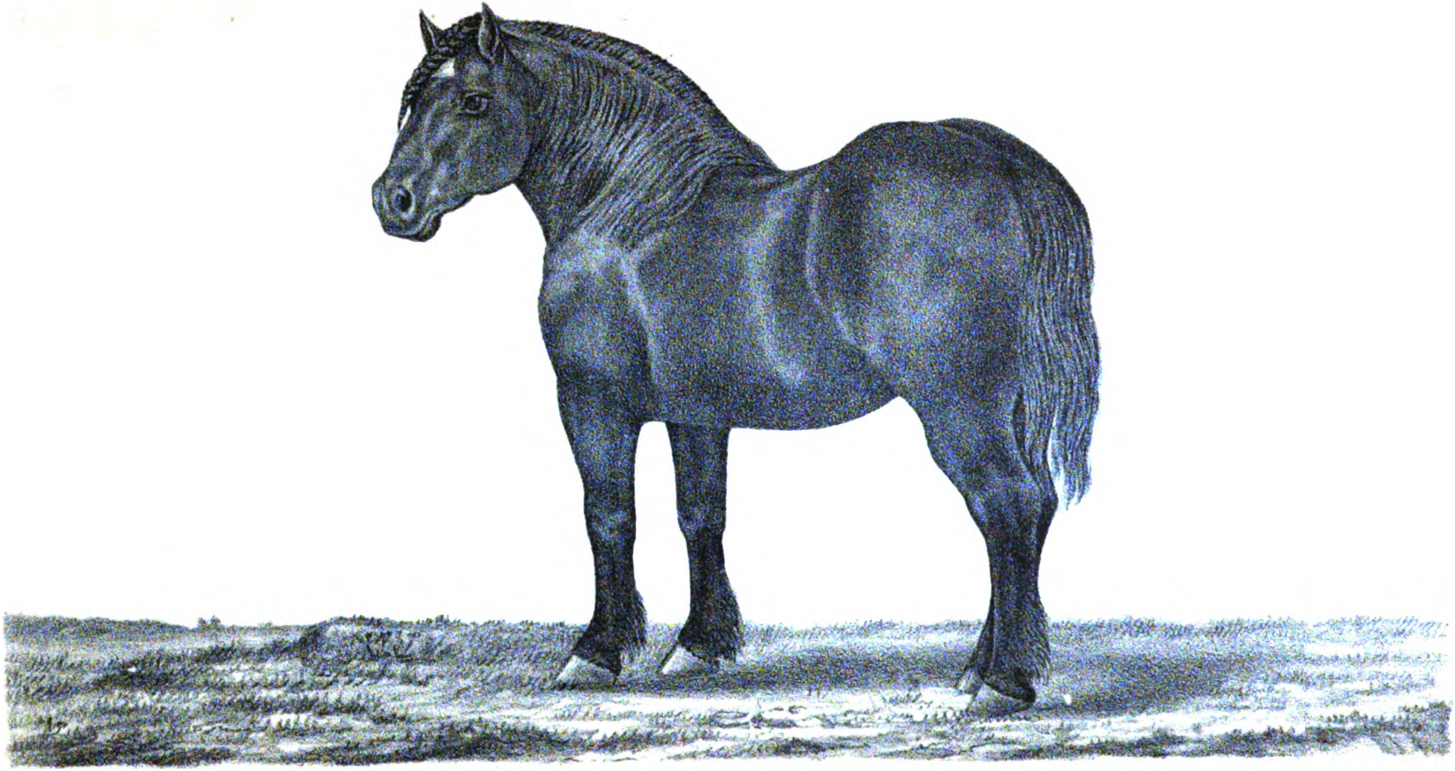
Mr. CHAIRMAN: Your committee, appointed by this, the Pennsylvania State Agricultural Society, for the purpose of inspecting and reporting upon the carp industry, beg leave to state that, in accordance therewith, it has performed the duty, and found it to be of a most interesting, pleasant, and instructive nature; that whilst other pressing duties necessitated the absence of some of the committee, we were fortunate in procuring a majority. In addition, we had with us Mr. George Finley, of Pittsburgh, Pa., a gentleman who has given the subject much thought, and who kindly accepted the invitation to be one of the party. He took a great interest in the discharge of the duties devolving upon us, and accompanied us through our entire labor.

On Tuesday, August 12, your committee started on its mission. The first ponds visited were those on the farm owned by Richard I. Lamborn, Esq., of which he has three, although not of very great area. They are, nevertheless, of fair extent, about the average size of the carp-ponds of the present time, the whole comprising about one half an acre in area, well filled with carp from sixteen to nineteen inches down to the small fry of last spring's hatching. Whilst lacking in some of the minor points which go to make up a perfect pond, they are, upon the whole, up to the standard of excellence in this infant industry at the present time. About the outlet from these ponds we will have more to say in the sequel.

Mr. Lamborn has an excellent water-supply, and some of his land now under cultivation might, at a small outlay, be converted into carp-ponds which would become both profitable and ornamental to his already beautiful homestead.

Carp, with Mr. Lamborn, are no longer an experiment. They have passed that point, and their profit as an article of food, and their excellence as a food fish, are with him no longer in the realms of doubt. Your committee can attest the latter from actual and gastronomical trial, of which more hereafter.

Passing farther down, to the adjoining farm of Robert Lamborn, the pro-



IMPORTED "PAUL."

Draught Stallion. Winner Second Prize, Pennsylvania State Fair, Philadelphia, 1885. Owned by Joseph R. Burkholder, Farmersville, Pa.

prietor of which gave us a hearty welcome to another of Chester county's jewels. we were shown to his pond, around which the members of your committee luxuriated in the shade, and were amused with the disporting of the fish in their eagerness to secure the food cast upon the surface of the water. During our stay here, our genial friend, Mr. Ingram, who resides near by, gave an ocular demonstration of the fallacy of the popular notion that the carp is not a game fish, *i. e.*, that it does not take the angler's hook. Mr. Ingram procured a rod and line, baited his hook with a small piece of bread, and, after a few casts, had the pleasure of seeing his swimmer suddenly lose its buoyancy and disappear under the water. A sudden twitch of the rod, and a rise out and above the water of a large fish, ended in the capture and landing of a 16-inch silvery carp. The vivacity of this fish, when hooked, was a pleasant surprise to all who saw it, and it was manifest to all who witnessed its actions that the carp is both a biter and a fighter, and that the amount of amusement it will afford in its capture in these artificial ponds is no inconsiderable factor in its value as a creature worthy of domestic care and culture. After the inspection of the carp and ponds of Mr. Robert Lamborn, and Richard, his brother, your committee returned to the residence of the latter, on the evening of the 12th, and were treated to a carp supper, upon the discussion of which hung the reputation of his carpship as an edible fish.

Upon this occasion, three fine carp of about three pounds each were produced—fresh, alive, and kicking—perfect beauties, and of the leather, or mirror carp, variety. Our expert friend, Marshall Ingram, acted as executioner. The unhappy victims were decapitated in the interest of carp science, and were prepared for the cook in the best style of our well-experienced friend. In due time, our genial hostess, Mrs. R. I. Lamborn, announced that supper awaited us all, which was heartily partaken of, during which the carp was discussed, in accordance with that old saying, "the proof, &c., is the eating thereof." It was unanimously voted a success as food fish. In point of texture of flesh, it much resembles the shad and white fish of our northern lakes. Its flesh, at least in this instance, was not wanting in flavor. Although the carp belongs to the sucker class, it is free from that bony objection peculiar to most of the sucker fish, and entirely free from the bunch-bones, or little bunches of detached bones, found in some varieties of the sucker family.

With the carp supper ended the labors of our first day, except to discuss the events thereof, and enjoy the hospitalities of our host, (R. I. Lamborn,) including breakfast next morning, the 18th. We also visited the pond of our valued friends, M. I. Ingram & Son, at which place several hours were pleasantly spent. We found the Messrs. Ingram's ponds equally interesting, dimensions probably one hundred and fifty feet square, occupying a piece of land better adapted to the purpose for which it is being used than to any other. Indeed, the showing of the fine silvery fish seen upon the water indicated about as much fish as water. Not satisfied with this showing, a net was produced, and with the aid of the juvenile members of the family, who took to the water, seven fine large fish, some eighteen inches long, came flopping out, the smaller ones escaping through the large meshes of the net. This was truly a sight seldom, if ever, seen in Chester county as the result of a purely domestic culture. This exhibit, although very gratifying to the members of your committee, did not appear to meet the expectations of the Messrs. Ingram, as, upon a former occasion, they had taken some twenty-seven large carp out at a single draw. Messrs. Ingram & Son are so well pleased with the success attending their efforts thus far that they have fully concluded to widen their field of labor in the line of carp-culture, having a fine supply of water and land, the topography of which is well suited to one or more ponds of much greater area than the one now in use, and almost over-populated with its finny denizens. Leaving our companionable friends with reluctance, we soon found ourselves on the road to the pond of John I. Carter, Esq., who, unfortunately, was absent from home. whose son and younger brothers showed, however. by their activity and intelligence that the absent parent was well represented by the boys at home. Here our vehicle was taken in charge, and notice being given that we were prisoners in their hospitable home (it being near the hour of twelve, M.) until after dinner, we were at once conducted to their carp-pond. The water of this pond was clearer and the supply stronger, and, consequently, less of pond character than the ones formerly visited, and the fish could be seen more distinctly and at a much greater depth in the water, all of which was suggestive to the close observer. We noticed that these carp, although they came readily to the surface and took the food without delay, thereby showing that they were accustomed to being fed, came at the food with a vivacity and trout-like vigor, sporting in the light, and shining like burnished silver. We made some inquiries relative to the growth of these fish, being somewhat skeptical that they would grow in water so clear and pure as that in which we saw them; and whilst no systematic or exact data could be given, yet their owners were loud in their praise as rapid growers.

Now, your committee feel certain that there is food for thought just here. Many persons are under the impression that carp grow only in foul ponds, or ponds that have little or no exchange of water. This is a mistaken notion, as is manifest in this marked instance, which proves the greater adaptability of the nature of this grand fish, so recently introduced amongst us, for the million. We verily believe that a portion of the money appropriated by the State, expended in some systematic experiments of an exact nature, could not but yield valuable and positive facts for beginners. Or, for instance: Suppose some one skilled in carp-culture having a suitable pond, say from one to two acres, to stock it up at once; in a very short time the county could be supplied. After receiving every attention at Mr. Carter's, including dinner and our horses cared for, we soon found ourselves on the road, and after a pleasant ride, the weather being all that could be desired for out door work, we arrived at the ponds of Joseph Pyle, Esq., of West Grove. We were so fortunate as to find the owner at home, who welcomed us heartily and tendered us all the information relative to his experience as a carp-culturist. Mr. Pyle, like all the rest visited, was quite enthusiastic on this subject, and avowed his great faith in its permanency and profit if conducted with any reasonable degree of care and intelligence. Mr. Pyle's ponds do not exceed in area more than one third of an acre, yet he has already filled several good orders for fish. He finds the water area pays better than any other kind of culture, and appears to place a high value on his ponds, and, like all others we had visited, found a measure of amusement in his attention to his fish which he could find nowhere else. Your committee were agreeably entertained here, as elsewhere.

Leaving West Grove, we drove to the farm of Thomas M. Harvey. We surprised friend Harvey in the very act of feeding and toying around his pond of carp, and giving some needed attention to his collection of aquatic plants. His ponds are in excellent condition, and bear on their bosom fine water-lilies, some of which were in bloom, and others, rare and of large size, about to bloom. These ponds, two in number, are well arranged, the smaller one being used as a breeding pond, and slightly elevated above the larger one, both apparently well adapted to the purpose intended. One novel feature of the larger pond it is here well to notice. It is a well-known fact that where the shores or levees around the ponds are bluff, the carp will burrow into the banks, and in some instances they are so persistent that leaks, culminating into breaks. are the result, and to such an extent did friend Harvey's carp mutilate the embankment that he was obliged to devise some means to stop it. He did so by procuring a long web of woven wire of suitable width, length, and proper mesh, forcing the edge down and into the water, compressing the upper edge close to the bank, just under the water surface, and at a suitable angle, there securing it by small hook-pins of wood. This, of course, proves a sovereign remedy against the boring propensity of the carp at this particular point, and compels them to work along the side next the high ground, where they can do no harm in thus working. This pond, to all appearances, afforded its owner a degree of pleasant recreative labor to care for, and I doubt, if results could be ascertained, whether this small body of water with its finny tribe did not afford its owner hours of amusement, probably second only to those derived from his splendid herd of registered Guernseys and his model pen of Yorkers.

The afternoon was now waning, and we had to reach the home of the writer, as our companion and valuable aid, Mr. George Finley, the carp-culturist, had to return to Pittsburgh the next morning we were compelled to forego the pressing invitation of Mr. Harvey to remain for supper, and parted with him with regrets that our sojourn was of such brief duration.

In conclusion, your committee has been fully convinced that there are great possibilities within the pale of carp-culture — at least all data point in that direction. Carp-culture, up to the present time, has been conducted doubtingly, investments made sparingly, and expectations more than realized, and we feel confident that this pleasing industry will, in the near future, assume proportions commensurate with its importance. The space occupied by laughing lakes will be ungrudgingly given, wherein will disport silvery beauties that will add a new feature to farm life. External marks were discovered by your committee, which, while not conclusive, we think may lead to a knowledge of the sexes of this fish. The number examined was so small (only three) that we deem it unwise to do more than merely thus refer to the matter at this time, but hope to have an opportunity to test our theory exhaustively. Inability to distinguish the sexes at all seasons of the year has been, in many instances, a serious impediment to carp-culture, and all the more so as it is now an accepted theory among culturists that the male fish largely outnumbers the female in a state of nature. Mr. Finley assures us that upon, one occasion of losing about forty carp by death, he opened them and found only sixteen that had spawn, *i. e.*, the layers of roe. These fish were of uniform age and size, and Mr. F. has good ground for believing that those that had *no ova* were all males, as it was early in the spring, and the ova in the females were their first crop.

As the fish had been hatched in his own ponds, he could not have been mistaken in their age; hence, persons ordering carp of large size, and few in number, are in danger of getting an undesirable proportion of, if not in many instances all, males. Mr. Finley further states, "that the rule of judging carp by their general external appearance, in very many instances, and at certain seasons of the year, is very unreliable, and the best of judges may be deceived." The fecundity of the carp, combined with its rapid growth, fully impressed your committee of the necessity of more and larger ponds. Those who have the land topographically adapted to be submerged. not excavated, should be up and doing. Ponds and lakes are the better for age. This work can be commenced at any season, when ground and weather will permit, and can be worked at from time to time.

Like Rome, ponds and lakes are "not built in a day." They require time, and, unlike the past, there is now no scarcity of stock fish, either small or large, and at a fraction of the cost of former years.

Since visiting the ponds of R. I. Lamborn, he has written the committee that he has just drained two of his ponds for the purpose of ridding them of all carp destroyers, and that each pond was found to contain nearly eleven hundred fish, varying in length from seven to eighteen inches, and countless numbers of recent spawn. Messrs. Ingram & Son have also since added other ponds to their already successful enterprise.

Your committee regret that time would not admit visiting other ponds, at a more remote distance, which would have been a great pleasure to its members.

Suffice it to say, in conclusion, that your committee is of the unanimous opinion that the culture of this great, and only great, pond fish should be encouraged. Of its success there can no longer be any doubt, and it is, in the near future, destined to become a profitable industry, and add a new factor to our means of food supply.

Carp-culture is a combination of the æsthetic and useful, blending of pleasure and labor—making our homes the better, by being more enjoyable, as well as more productive.

All of which is most respectfully submitted.

D. H. BRANSON, *Chester county*,
GEORGE BLIGHT, *Philadelphia*,
WM. H. EGLE, M. D., *Harrisburg*,
Committee.

Mr. KENNEDY moved that the reports made by Messrs. Branson and McDowell on experiments with premium seed wheat and oats, the report on carp-culture, and also the report on competitive trial of wind-mills, be published—one thousand of the reply to the Governor, separately, and four thousand of the other together in pamphlet form.

Mr. RHEY moved to make five thousand of each.

Agreed to.

Mr. RHEY. Mr. President, I think it very proper that a report should be made showing what this Society has done, and endeavored to do, in the interests of agriculture. We have repeatedly requested appropriations for an exhaustive trial of agricultural implements to be made at a proper time in the year, when such results would be of the greatest importance to the farmers. We have requested the Legislature to enact laws governing roads; to pay a chemist to ascertain, by actual efforts, how to utilize the wasted manures of the State; to secure correct statistics of the productions of the soil—cost of same—to be sent out and tabulated by the Secretary of the Interior's office.

Mr. BRANSON. I move you, sir, that when the committee report u[illegible] Governor's message, and it is printed, that one copy be presented [illegible] member of the House and Senate.

The motion was seconded by Mr. MCKEAN, and unanimously agreed to.

Mr. HIESTER. I do not see any reason why we should withhold a copy of that from the Governor. I believe his name was not mentioned.

President WILHELM. Of course, that includes the Governor. He is one of the officers of the State Government.

Secretary SEILER. There was a committee appointed at our last exhibition to report upon General Pleasanton's exhibit. Mr. Landreth is one of the members of that committee, and also Mr. Branson.

Mr. LANDRETH. In response to that inquiry, I would say that the committee were appointed at a late hour, and it so happened that there was such a pressure of business upon each of the members that we could not get together, and no report was made. The committee reports progress.

Secretary SEILER. I move that the report be accepted, and the committee be continued to make further report.

The motion was seconded and agreed to.

Mr. RHEY offered a resolution, as follows:

Resolved, That the committee having in charge the remarks of Governor Pattison upon the Pennsylvania Agricultural Society be requested to embody in their report the acts of the Pennsylvania Agricultural Society, as far as they can do so conveniently.

Secretary SEILER. I would second that resolution.

Mr. MCKEAN. As I understand this, we want to get this report of the committee on Governor Pattison's message as promptly as we can. This will cause delay. I think it will be a great deal better to let this subject stand as it is.

Secretary SEILER. I would suggest that Mr. Rhey, as a committee, be appointed to get up this report.

Mr. RHEY. What I have in view is in this connection. We want to make it emphatic, if we can.

Secretary SEILER. I move that a separate committee of three be appointed to secure the information desired in that resolution, and that Mr. Rhey be the chairman of that committee.

The motion was seconded by Mr. MILES and agreed to.

Whereupon, the PRESIDENT appointed as the committee Messrs. Rhey, Seiler, and McConkey.

Mr. RHEY. I move that a committee be appointed, if the Secretary will tell us that he can afford to spend money enough,—I don't know anything about it,—to investigate thoroughly and report on the whole subject of ensilage; the report of this committee to exhibit results of their investigation.

The motion was seconded by Mr. WILHELM.

Mr. RHEY. I don't know whether I would be indulged or not, but I want to say a word. If there is any one thing that it seems to me to have been a step forward in agriculture during my lifetime, it is the subject of ensilage. We all know that neat cattle, and that all descriptions of animals, thrive in the highest degree in the summer when they can get grass. The effort, I take it, of all intelligent farmers has been, in all past time, to get a substitute for the green grass of the summer in the winter time. In this country we have failed to get that, unless ensilage has produced it. We have tried Swedish turnips and sugar-beets, and it seems to be impossible to avail ourselves of their value. Ensilage seems now to promise what we need. There are very few who can afford to make experiments whether that opin-[illegible] correct one, or erroneous; and there are so many gentlemen who [illegible]de tests that are entirely competent to make them, that all I think we need to do to warrant us in acting properly, and to enable others to take a proper course, is to have a committee appointed to investigate and report. I hope that such a committee will be appointed, if we have the means, and that they will get to work promptly.

The motion was seconded and unanimously agreed to.

The PRESIDENT. Is this committee to report at the annual meeting?

Mr. RHEY. Yes, sir.

Whereupon, the PRESIDENT appointed Messrs. Rhey, Hiester, and Spencer as the committee.

On motion of Mr. **MILES** and Mr. **MCKEAN**, the committee thereupon adjourned.

D. W. **SEILER**,
Recording Secretary.

PHILADELPHIA, *September 18, 1885.*

The meeting was called to order by President **MILES**. Present: Messrs. Rhey, Holstein, Tripp, Branson, McKean, Kennedy, Wilhelm, McDowell, Barto, McConkey, and Seiler.

On motion of Mr. **RHEY**, the reading of minutes of the last meeting was dispensed with.

The awards, as made by the juries, were read.

Mr. **SEILER** moved that a special award of one hundred dollars be made to J. Cheston Morris for his herd of Devons for milking qualities.

Mr. **WILHELM** moved that it be referred to the Committee of Arrangement.

Which was agreed to.

A letter from Samuel Wilson was read, when Mr. **RHEY** explained that the committee recommended a special premium of fifteen dollars to that gentleman.

The awards on Hereford cattle were, on motion, referred to the Committee of Arrangement to adjust.

Also. the Ayrshire class, a special premium of twenty-five dollars was referred to same committee.

Mr. **WILHELM** moved that no awards be made for threshers, plows, harrows, or other agricultural implements in classes 70–71–72–73 and No. 1506 of class 76, where no practical test had been made.

Mr. **MCCONKEY** moved that the test *agreed to* of wind-mills, for competitive trial, be postponed until next year.

Which was amended by Mr. **WILHELM**, that the Committee on Test of Wind-Mills be continued, and that they have full power to act, and that the committee on the same report to the Committee of Arrangement.

Agreed to.

Mr. **SEILER** moved that a life membership be voted to James B. Doyle for services rendered.

Agreed to.

After discussion, the price of life membership was fixed at fifty dollars.

Mr. **SEILER** gave notice that an amendment to the constitution would be presented at the annual meeting, next January—electing one of the Vice Presidents as the first Vice President, to act as President in case of absence or death, giving the President power to fill vacancies caused by death or resignation, and the Secretary power to approve bills made by him.

The "blue glass" theory of General Pleasanton was referred to Messrs. Landreth, Haldeman, and Branson to report.

Adjourned.

PENNSYLVANIA STATE FAIR, 1885. SECTION 1.—SCHEDULE OF CLASSIFICATION.

DEPARTMENT I.—LIVE STOCK.

GROUPS.	CLASSES.	PREMIUM LIST, NOS.
I.—Horses and Mules,	1. Thoroughbred. 2. Finebred. 3. Carriage, Coach, and Light Draught. 4 and 5. Draught. 6. Harness and Saddle. 7. Horse and Mule Teams,	1-64
II.—Cattle,	8. Short horns. 9. Devons. 10. Holsteins. 11. Ayrshires. 12. Jerseys. 13. Guernseys. 14. Herefords. 15. Other recognized breeds. 16. Fat Cattle,	70-147
III.—Sheep,	17. Merinos. 18. Middle Wool. 19. Long Wool. 20. Fat Sheep,	150-193
IV.—Swine,	21. Chesters. 22. Berkshires. 23. Poland Chinas. 24. Jersey Reds. 25. Yorkshires. 26. Essex. 27. Suffolk. 28. Cheshires,	200-278
V.—Poultry and Fur-bearing Pets,	29. Gallinaceous. 30. Aquatic. 31. Pigeons and Cage and Ornamental Birds. 32. Fur-bearing Pets,	300-482
VI.—Industrial Insects,	33. Bees. 34. Honey and Wax. 35. Hives and Appliances. 36. Silk Worms,	485-540
VII.—Fish,	37. Food Fishes,	550
VIII.—Dogs,		575-695

DEPARTMENT II.—FARM AND GARDEN PRODUCTS, AND THEIR PROXIMATE MANUFACTURES.

GROUPS.	CLASSES.	
IX.—Meats and Dairy Products,	38. Meats and Cured Fish. 39. Dairy Products,	750-781
X.—Skins and Fiber,	40. Skins and Animal Fiber. 41. Vegetable Fiber,	789-833
XI.—Grain and Seeds,	42. Grain and Seeds, by Societies. 43. By Companies. 44. By Individuals or Firms.	834-896
XII.—Vegetables and Grasses,	45. Tubers, Bulbs, and Roots. 46. Grasses and Green Vegetables,	900-1037
XIII.—Fruits and Nuts,	47. Grapes, Stone Fruits, and Pomaceous Fruits. 48. Berries, Nuts, and Tropical Fruits,	1040-1184
XIV.—Farinaceous Products,	49. Ground, Crushed, and Malted Grain. 50. Bread and Pastry,	1190-1209
XV.—Sugars and Narcotic and Acid Products,	51. Sugars. 52. Tobacco. 53. Hops and Fermented Liquors.	1210-1248
XVI.—Ornamental Plants and Flowers,	54. Growing and Ornamental Plants 55. Cut Flowers and Designs,	1260-1330

DEPARTMENT III.—IMPLEMENTS AND MACHINERY FOR TRANSPORTATION AND FOR AGRICULTURE.

GROUPS.	CLASSES.	
XVII.—Transportation,	56. Freight and Business Vehicles. 57. Pleasure Carriages,	1335-1374
XVIII.—Clearing, Tilling, and Planting,	58. Clearing Land. 59. Turning and Working Soil. 60. Planting and Sowing,	1376-1420
XIX.—Gathering Crops,	61. Mowing and Reaping. 62. Lifting and Storing,	1422-1449
XX.—Preparing Products for Market and Consumption,	63. Dairy Fittings and Appliances. 64. Sugar Making. 65. Flour and Feed Making. 66. Preparing Products other than above,	1450-1536
XXI.—Miscellaneous,		1540-1567

APPENDIX.

Field Crops. Reports and Essays.

RULES AND REGULATIONS

ADOPTED BY THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

The attention of exhibitors is particularly called to the general regulations governing the Exhibition, as well as to the rules and directions contained in the Lists of Premiums of the Thirty-first Annual Exhibition.

Competition Free.

In the Department of Live Stock, competition is open to the people of all nations; in the other departments, to the people of all the States of the Union.

Entries.

No entry fee is required, except for the grand prizes in the horse group, for the herd prizes in the cattle group, and for the flock prizes in the sheep group—when a fee equal to ten per cent. of the gross amount of the prize must in all cases accompany the entry; and also in groups V and VIII, agreeably to the rules and regulations published in the special premium lists of those groups, to be obtained of the secretaries.

Blank forms of application for space will be furnished gratuitously, which applicants must fill up, indicating, whenever possible, the premium list number under which the object is to be exhibited.

The buildings and grounds will be open for the reception of all objects except live stock on Monday, September 7.

All expenses of transportation, and transfer to the space allotted, must be paid by the owner or agent.

Exhibitors of tools, implements, machinery, and manufactured goods will give the name of the patent (if any), also the name and post-office direction of the manufacturers.

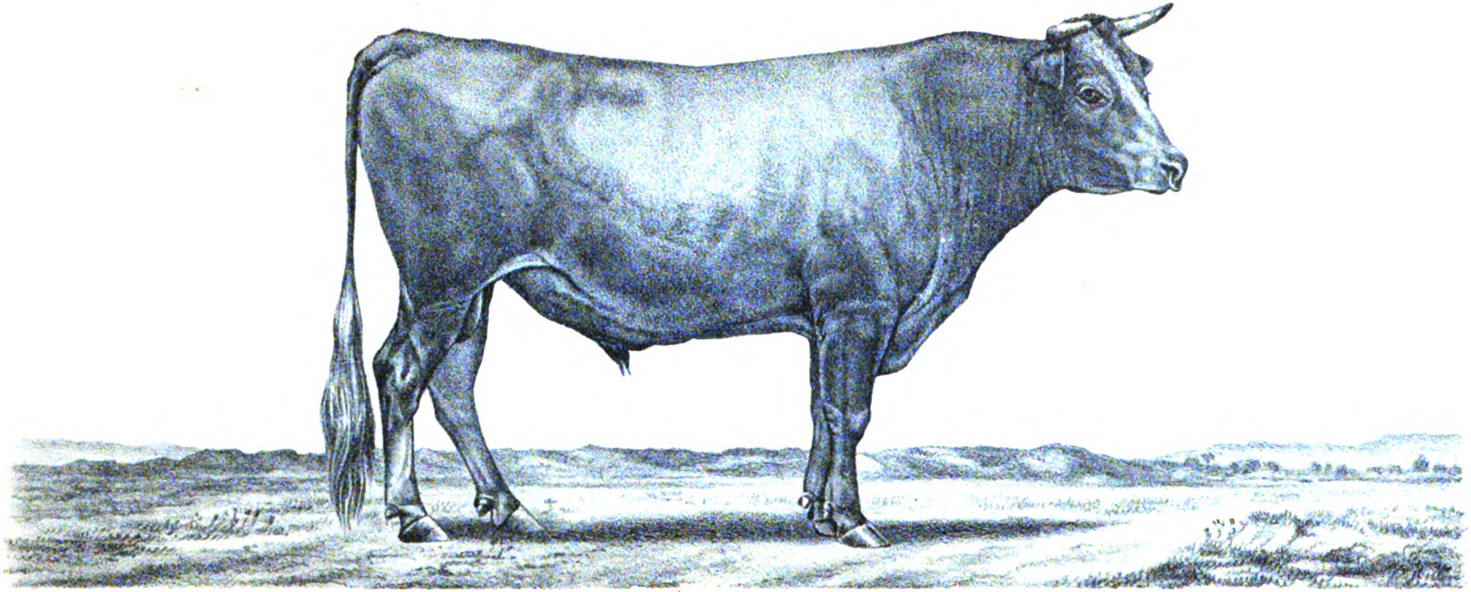
The books of entry will be opened at the office, Thirteenth and Market streets, Philadelphia, on Tuesday, August 10. They cannot be inspected by any but the proper officers until the awards have been announced.

All articles consigned for exibition in Section I should be addressed to the name of the person exhibiting, care of the Secretary of the Pennsylvania State Agricultural Society, Germantown junction, on the Pennsylvania railroad, or Sixteenth street station, on Philadelphia and Reading railroad, Norristown branch, Philadelphia, Pa.; the freight must be prepaid.

Exhibitors of machinery are especially requested to ship goods early. If this be complied with, and articles consigned as above, exhibitors, on their arrival, will find them on the fair grounds.

Exhibitors must have their articles and animals entered on the Secretary's books by ten o'clock, P. M., on Wednesday, September 16. After that time the books will positively be closed against new entries in all of the classes. This regulation will be rigidly enforced by the officers of the Society.

All who intend to exhibit imported or thoroughbred animals must produce an authentic pedigree of each, and file the same, with a list of the stock, in the Secretary's office, on or before Wednesday, September 16, stating to what group and class the animals belong. This will facilitate the



"DUKE OF CLOVERDALE," 6994.

Winner First Prize, Pennsylvania State Fair, Philadelphia, 1885. Owned by J. V. & C. Ramsden, Morton, Pennsylvania. From instantaneous photograph by Schreiber & Sons, Philadelphia.

preparation of the list of entries, and, in case of defective pedigrees, afford the owner time to correct the same. Cases not unfrequently occur in which premiums are withheld on account of non-compliance with this regulation.

The age of each animal must be computed up to September 23, 1885, except in the case of horses, where the stud-book regulations will be enforced.

Allotment, Arrangement, and Removal.

When an allotment for space has been definitely made, the applicant will be notified and a permit for space sent him.

When his articles or animals arrive at the entrance gate, this permit must be shown at the Secretary's office. It will there be indorsed. Without this indorsement, objects can neither be unpacked nor arranged for exhibition. A card obtained at the Secretary's office, and containing number, group, and brief description, must in all cases be affixed to an object before it is arranged.

No assignment of stalls for stock will be made until all applications are filed, when members of each recognized breed will be allotted stalls adjoining each other. The stalls will be of the same size and there is no choice of location.

At the time of making applications for stalls, there must be a deposit of one dollar for each stall assigned, which money will be held as security and be refunded to exhibitor when the stock is placed in position. In case of failure to exhibit, the money to be the property of the Pennsylvania State Agricultural Society.

All articles and all animals, except horses, must be within the gates on Wednesday, September 23, in order that they may be arranged for immediate examination by the juries. Horses must be in their stalls on Thurday, September 24, at noon, or they will be ruled out of competition. The superintendent has orders to enforce this regulation, which he will strictly execute.

Exhibitors are required to give personal attention to their articles and animals, and at the close of the exhibition to attend to their removal, as the Executive Committee will not assume further responsibility. Exhibitors must show their permits for space to the superintendent in charge, before attempting to remove their objects.

Feed and Litter.

Fifteen pounds of hay will be provided daily for each head of horned stock and for each horse, free of cost. If this is wasted or destroyed, no more will be issued until used with judgment.

Straw sufficient for bedding, and *green food* for all the milch cows on exhibition, will also be furnished free. Grain will be provided at cost price for those who desire to furnish feed for their stock.

Shafting and steam-power will be supplied gratuitously to exhibitors of machinery in motion. Counter-shafts, and all necessary appliances, must be furnished by exhibitors, at their own cost.

Exhibitors will be required to maintain supervision over all gear supplied by them, and to furnish attendants to operate their machinery. This must be inclosed by a railing of the uniform height of two feet ten inches.

Applications for motive-power should be made before September 10. They must state actual horse-power required, and width of face and diameter of pulley.

The Executive Committee and the Committee of Arrangement.

The Executive Committee may revise the premiums awarded, and, if in its judgment proper and advisable, may, at any regularly-called meeting, alter or reverse the award of the juries. All superintendents, and others in charge, will be subject to the Committee of Arrangements.

The committee will take every precaution in its power to secure the safety of articles and live stock after arrival and arrangement for exhibition, but will not be responsible, not being "common carriers," for any loss or damage that may occur.

The committee does not assure any exhibitor who neglects the requirements that his objects will be passed upon by the juries.

Every effort will be made to secure the examination of all the objects in competition, but justice to those who comply strictly with the rules of the Society requires that they shall, in all cases, first receive attention.

Membership and Admission.

Single admission, ...	$0 50
Life membership, ...	50 00

The issue of free passes is to be exclusively confined to representatives of the press and railroad officials. The issue of complimentary family tickets is expressly prohibited.

Tickets of life members of the Pennsylvania State Agricultural Society, which admit a life member and all of his family under twenty-one years of age, will be furnished on application, either personally or by letter, stating full name and direction, to D. W. Seiler, Recording Secretary.

Exhibitors' and attendants' tickets will be issued by the Recording Secretary, at a charge of two dollars and fifty cents each. These will be good for two admissions daily. These tickets are not transferable. If used by any other person than by him in whose name they are issued, they will be forfeited; if lost, no duplicate will be issued. No attendant or operator will be allowed a ticket free, unless the exhibit is of such a character as to require it, and the number of said tickets issued shall be such, as in the judgment of the Recording Secretary, may be necessary. But one member of a firm will be recognized as an exhibitor. All complimentary exhibitors' and attendants' tickets must be presented at the gate situated between the Pennsylvania railroad and the Philadelphia and Reading railroad entrances.

General Instructions to the Juries.

No attention will be given by the juries to any article without its number and card. Juries on live stock shall not go beyond the premium list in any case whatsoever.

The juries on all animals will have regard to the symmetry, early maturity, size, and general qualities characteristic of the breeds which they inspect. They will make due allowance for the effects of age, feeding, and other circumstances, on the character and condition of the animals.

The juries will not give encouragement to overfed animals. They will not, except in classes sixteen and twenty, award premiums for animals which appear to be fattened for the butcher.

The juries may require all the cattle and horses to be weighed, and they will take measures to include the results in their reports.

No animal shall be eligible to entry in more than one class, except stallions and their get, which, having been entered by a single owner in their proper class, may also be entered by him for the sweepstake purse, and cattle, which, having been entered by a single owner in a thoroughbred class, may be allowed to compete as members of herds in the same class and under the specifications.

No person will be allowed to interfere with the juries while in the discharge of their duties; and any person interfering, by letter or otherwise, will be excluded from competition.

No animal or article can take more than one premium, unless especially provided for in the specifications.

When there is but one exhibitor, although he may show several animals or articles in a group or class, only one premium will be awarded to one animal or article, the premium to be first, or otherwise, as the merit of the animal or article may warrant.

When there is but one exhibitor under a premium list number, the jury will not award a premium, unless the entry is of unusual excellence or of decided general value.

Unless otherwise indicated, no barren animal shall be allowed to compete for a premium. If required, evidence must be produced that animals which have reached the proper age are breeders.

The juries shall, in all cases, withhold premiums where the animal is not worthy, though there be no competition.

Should any animal or article have been entered in any other name than that of its *bona fide* owner, the exhibitor who made the entry cannot be allowed a premium, although one has been awarded by the jury. Such exhibitor shall be precluded from competing at any future exhibition of the Society.

Articles for which no premiums are offered will be entered in the class to which they properly belong, and will be passed upon by the jury on that class. The jury may recommend such premiums as its judgment may dictate, but each of these awards, which must not exceed a diploma or a bronze medal, will be subject to the approval of the Executive Committee

Ribbons of the following colors will be used by the superintendent in decorating the horses and cattle that have been publicly awarded premiums: First premium, blue; second premium, red; third premium, white; stallions and their get, and herd prize cattle, yellow.

How Premiums May Be Commuted.

No diploma will be awarded by juries, or allowed by the Society, for any object on exhibition, unless the object is entitled to a premium of ten dollars, or more. In other terms, the Society deems its diploma to possess value equal to a cash premium of ten dollars. The exhibitor entitled to a prize will be at liberty to commute a money premium for a diploma, but not the award of a diploma into a money premium.

Payment of Premiums.

Cash premiums will be paid by the Treasurer of the Pennsylvania State Agricultural Society on Wednesday and Thursday, October 14th and 15th, at his office on the exhibition grounds. Exhibitors to whom premiums have been awarded must apply after that date in person or by letter to the Treasurer at Harrisburg.

Premiums will not be paid on animals or articles removed from the exhibition without the written approval of the President.

Persons to whom medals and diplomas have been awarded will please furnish their full names and directions to the Recording Secretary. After allowing time for their proper preparation, medals and diplomas will be delivered to exhibitors entitled to receive them, or forwarded to them free of charge, in such manner as they direct.

Premiums of every description awarded must be claimed within twelve months from the time of award, or they will be deemed forfeited, unless otherwise ordered at a meeting of the Executive Committee.

The Secretaries can be addressed at Harrisburg after the close of the exhibition.

A. WILHELM, *President.*

D. W. SEILER, *Recording Secretary.*
ELBRIDGE MCCONKEY, *Corresponding Secretary.*

OFFICE OF
PENNSYLVANIA STATE AGRICULTURAL SOCIETY,
N. E. Cor. Thirteenth and Market Sts., Phila., August 1885.

COMMITTEE OF ARRANGEMENT OF THE PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

A. Wilhelm, York county, *President.*

George Blight, Philadelphia,
Alfred L. Kennedy, Philadelphia,
Jefferson Shaner, Chester county,
Elbridge McConkey, Dauphin county,
Corresponding Secretary.

L. Henry Twaddell, Philadelphia,
Burnet Landreth, Bucks county,
Joseph A. Paxson, Philadelphia,
D. W. Seiler, Dauphin county,
Recording Secretary.

COMMITTEES OF CO-OPERATION.

PITTSBURGH COMMITTEE.

Edward Gregg, Pittsburgh, *Chairman.*

John McDowell, Washington,
T. F. Grubbs, Pittsburgh,
W. W. Speer, Pittsburgh,
E. P. Young, Pittsburgh,
J. A. McKean, Pittsburgh,
I. D. Risher, Pittsburgh,
E. J. Unger, Pittsburgh.

Acting as the General Committee of Coöperation in Pittsburgh.

WOMAN'S SILK CULTURE ASSOCIATION.

Mrs. John Lucas, *Chairman.*

And the Managers of the Association.

APPOINTED BY THE

STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANA.

Calvin Cooper, Bird-in-Hand, *Chairman.*

H. M. Engle, Marietta,
J. Hibberd Bartram,
E. Satterthwait, Jenkintown,
H. S. Rupp, Shiremanstown,
George D. Stitzel, Reading.

APPOINTED BY THE

PENNSYLVANIA STATE DAIRYMEN'S ASSOCIATION.

A. M. Fuller, Meadville, *Chairman.*

W. P. Hazard, West Chester,
John Fuller, Meadville,
L. C. Magaw, Meadville,
J. H. Lenhart, Meadville,
R. H. Odell, Meadville.

APPOINTED BY THE

PENNSYLVANIA STATE POULTRY SOCIETY.

J. D. Nevius, *Chairman.*

Belmont Perry,
A. P. Groves,
Mark Schofield,
A. F. Bancroft,
Geo. D. Lewis,
Richard Young,
E. L. Pennypacker,
G. Schreiber,
Geo. McCracken,
S. K. Worrell,
J. G. Darlington.
Thomas Armstrong,
John Wilson,
Wm. J. Baldwin,
F. A. Mortimer,
J. H. S. Milligan,

PHILADELPHIA BEE-KEEPERS' ASSOCIATION.

Dr. H. C. Townsend, *Chairman.*

And the Managers of the Association.

APPOINTED BY THE

PHILADELPHIA KENNEL CLUB.

E. Comfort, *Chairman.*

B. Ridgway,
J. A. Stovell,
Geo. Esherick,
Chas. T. Thompson,
J. A. E. Walk,
C. Howard Clark, Jr.,
W. H. Ashburner,
A. Glass, V. S.,
B. C. Satterthwaite,
E. W. Clark, Jr.,
V. M. Haldeman,
I. H. Roberts,
Chas. H. Clark.
M. Richardson,
E. F. Partridge,
Wm. H. Child,
Geo. DeHaven,
Ed. Dudley,
C. S. Westcott,

VI. *a*. AWARDS OF THE JURIES. SECTION I.

Annual Exhibition, held at Philadelphia, September 23 to October 14, 1885.

CLASS 1—THOROUGHBRED HORSES.

William Armstrong, Montgomery Square, Pennsylvania, stallion, "Lyttleton," eighteen years old, first premium,	$100 00
Walter Gratz, Chestnut Hill, Pennsylvania, stallion, "Big Sandy," sixteen years old, second premium, . .	75 00
J. Howard Lewis, Jr., Media, Pennsylvania, stallion, "Swarthmore," one year old, first premium,	20 00
J. Howard Lewis, Jr., Media, Pennsylvania, brood mare "Blossom," ten years old, first premium,	50 00
Walter Gratz, Chestnut Hill, Pennsylvania, brood mare, "Blush Rose," four years old, second premium, .	30 00
J. Howard Lewis, Jr., Media, Pennsylvania, filly, "Nannie Gentry," three years old, first premium,	40 00
William Armstrong, Montgomery Square, Pennsylvania, filly, "Industry," three years old, second premium,	25 00
William Armstrong, Montgomery Square, Pennsylvania, filly, one year old, first premium, ...	20 00
J. Howard Lewis, Jr., Media, Pennsylvania, filly, one year old, second premium, ...	15 00

(Signed) ELBRIDGE MCCONKEY, *Chairman.*
TOBIAS BARTO,
THEODORE JUSTICE.

CLASS 2—FINE BRED HORSES.

Joseph C. Beyer, Norristown, Pennsylvania, stallion, "Membrino Hasson," eleven years, first premium, .	$100 00
Charles Scattergood, Philadelphia, Pennsylvania, stallion, "Scattergood's Almont," eight years, second premium, .	75 00
Joseph C. Beyer, Norristown, Pennsylvania, stallion, "Maxey Cobb, Jr.," four years, ...	40 00
S. A. Tanner, Suffolk Park, Pennsylvania, stallion, "Common Sense," three years, first premium,	50 00
Charles Laverty, Philadelphia, Pennsylvania, stallion, "Silver Gould," three years, second premium, . . .	30 00
Robert B. Beith, Philadelphia, Pennsylvania, stallion, "George," two years, ...	20 00
Charles Laverty, Philadelphia, Pennsylvania, stallion, "Message," one year, first premium, ...	20 00
Charles Scattergood, Philadelphia, Pennsylvania, stallion, "Col. Snowden," one year, first premium, ...	15 00
N. Hallowell, Rising Sun, Pennsylvania, brood mare, "Lady H.," seven years, first premium, ...	75 00
Charles Lafferty, Philadelphia, Pennsylvania, brood mare, "Jennie Piiot," thirteen years, second premium, ...	40 00

Charles Lafferty, Philadelphia, Pennsylvania, brood mare, "Thornetta Washington," four years, first premium,	$50 00
H. K. Kindig, Philadelphia, Pennsylvania, brood mare, "Nettie Dell," four years, second premium,	30 00
Charles Laverty, Philadelphia, Pennsylvania, filly, "Pilotta," three years, first premium,	40 00
Charles Lafferty, Philadelphia, Pennsylvania, filly, "Pilotta Gould," three years, second premium,	25 00
S. A. Tanner, Suffolk Park, Pennsylvania, filly, "Roberta," one year, first premium,	20 00
Charles Laverty, Philadelphia, Pennsylvania, filly, "Fannie Messenger," one year, second premium,	15 00
Charles Scattergood, Philadelphia, grand prize sweepstakes, the get of "Scattergood's Almont,"	150 00

JOHN S. MILLER,
J. MONTGOMERY,
H. E. HERSHEY,
S. A. HUMMEL,
JAMES D. McCLELLAN.

The foregoing committee make the above awards.

A. WILHELM,
President Pennsylvania State Agricultural Society.

CLASS 3—CARRIAGE, LIGHT-DRAUGHT HORSES.

I. H. Dahlman, New York city, stallion, "Celsbre," five years, first premium, A. J. Cassatt, Berwyn, Pennsylvania, stallion, "Carbineer," five years, first premium,	Divided, $150 00
I. H. Dahlman, New York city, brood mare, "Skyrocket," six years, first premium,	50 00
I. H. Dahlman, New York city, brood mare, "Sugar Cane," six years, second premium,	30 00

ELBRIDGE McCONKEY, *Chairman*,
THEODORE JUSTICE,
TOBIAS BARTO,
Committee.

CLASS 4—DRAUGHT HORSES.

J. L. Kunkle, Irwin, Pennsylvania, stallion, "Druid," five years, first premium,	$100 00
Joseph R. Burkholder, Farmersville, Pennsylvania, stallion, "Paul," eight years, second premium,	75 00
I. H. Dahlman, New York city, stallion, "Mercure," four years, first premium,	40 00
J. L. Kunkle, Irwin, Pennsylvania, stallion, "Orphan," three years, first premium,	50 00
J. L. Kunkle, Irwin, Pennsylvania, stallion, "Farmer," three years, second premium,	30 00
J. L. Kunkle, Irwin, Pennsylvania, stallion, "Taylor," two years, first premium,	30 00
J. L. Kunkle, Irwin, Pennsylvania, stallion "Prince Anchoria," two years, second premium,	20 00
J. L. Kunkle, Irwin, Pennsylvania, stallion, one year old,	15 00
I. H. Dahlman, New York city, brood mare, "Sadie," five years, first premium,	50 00

Abram Longnecker, Schenksville, Pennsylvania, brood mare, "Lyonnaine," five years, second premium,	$30 00
Abram Longnecker, Schenksville, Pennsylvania, filly, "François," three years, first premium,	40 00

TOBIAS BARTO,
WM. TAYLOR,
Committee.

CLASS 5—DRAUGHT HORSES.

A. Ward & Sons, Ridley Park, Pennsylvania, stallion, "Gray Richard," ten years, second premium,	$40 00
J. B. Kindig, Lancaster, Pennsylvania, brood mare, with foal at foot, first premium,	50 00
Jeremiah Ruth, Allentown, Pennsylvania, brood mare, with foal at foot, second premium,	25 00

TOBIAS BARTO,
WM. TAYLOR,
Committee.

CLASS 6.

Exhibit of S. H. French, Stockton Park, New Jersey: a pair of Mexican ponies; a pair Canadian ponies; a Shetland pony; be awarded a silver medal and deploma.

L. HENRY TWADDELL.

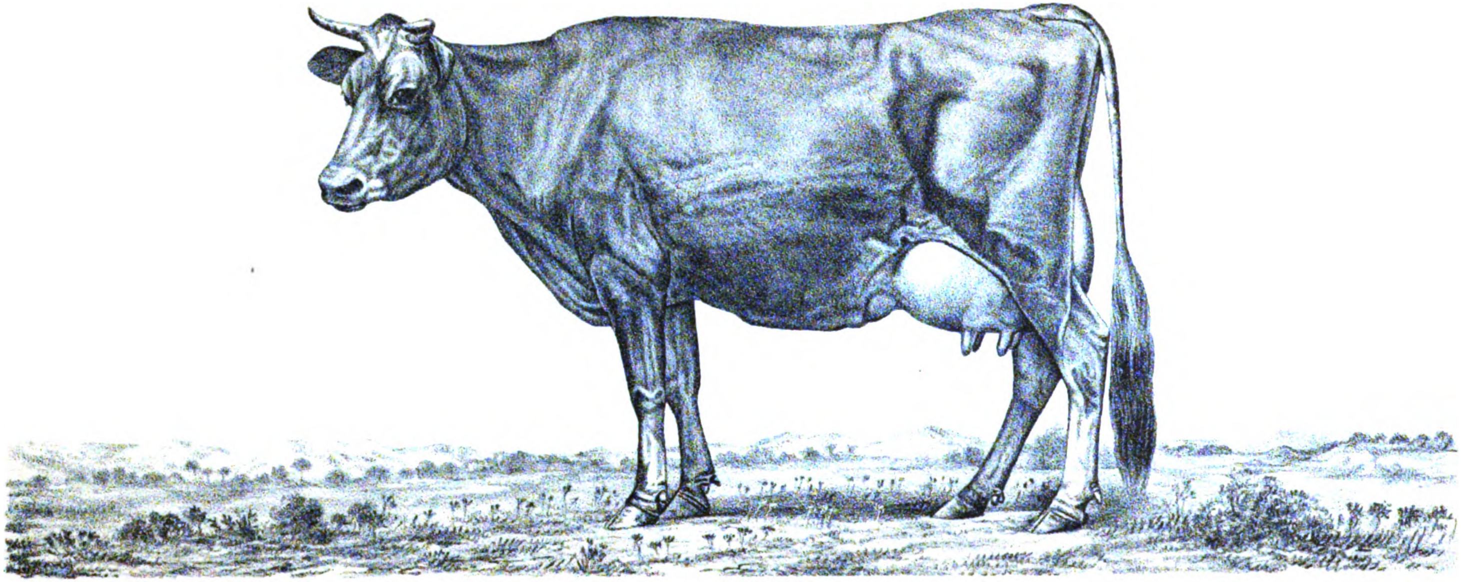
CLASS 7—HORSE AND MULE TEAM.

I. H. Dahlman, New York city, first one four-horse team,	$50 00

TOBIAS BARTO,
WM. TAYLOR,
WM. G. PARKE,
Committee.

CLASS 8—SHORT HORNS.

J. R. Anderson & Son, Anderson, Ohio, bull, "Enterprise," five years, first premium,	$75 00
N. S. Olin & Son, Streesboro', Ohio, bull, "Tippecanoe," three years, second premium,	50 00
Jeremiah Ruth, Allentown, Pennsylvania, bull, "Jonas," four years, third premium,	25 00
N. S. Olin & Son, Streesboro', Ohio, bull, "Matilda's Grand Duke," one year, first premium,	40 00
J. R. Anderson & Son, Anderson, Ohio, cow, "Minnie Springdale," four years, first premium,	60 00
N. S. Olin & Son, Streesboro', Ohio, cow, "Lady Florence," four years, second premium	40 00
N. S. Olin & Son, Streesboro', Ohio, cow, "Lady Ruth," four years, third premium,	20 00
J. R. Anderson & Son, Anderson, Ohio, cow, "Jennie Howell," three years, first premium,	40 00
N. S. Olin & Son, Streesboro', Ohio, heifer, "Miss Hathaway," two years, first premium	30 00
J. R. Anderson & Son, Anderson, Ohio, heifer, "Morinne," two years, second premium,	15 00
J. R. Anderson & Son, Anderson, Ohio, heifer, "Jennie Howell, 2d," two years, third premium,	10 00



"PRINCESS, 2d," 8046.

Record 46 pounds 12½ ounces in 7 days. Winner First Prize Pennsylvania State Fair, Philadelphia, 1884.
Owned by Mrs. S. C. A. Shoemaker, Baltimore, Maryland. From instantaneous
photograph by Schreiber & Sons, Philadelphia.

N. S. Olin & Son, Streesboro', Ohio, heifer, "Oneida Lass," one year, first premium . .	$20 00
N. S. Olin & Son, Streesboro', Ohio, heifer, "Barrington's Grand Duchess," one year, second premium . . .	15 00
J. R. Anderson & Son, Anderson, Ohio, best bull, first premium,	50 00
J. R. Anderson & Son, Anderson, Ohio, best cow, first premium,	50 00
J. R. Anderson & Son, Anderson, Ohio, herds, first premium, .	150 00
N. S. Olin & Son, Streesboro', Ohio, herds, second premium, . .	75 00

We would most respectfully make the above awards.

JAMES MILES,
ABNER RUTHERFORD,
Committee.

CLASS 9—DEVONS.

Barker Bros., Franklin Falls, Pennsylvania bull, "Prince of Wales, 19th" four years, first premium, ...	$75 00
Joseph Hilton, New Scotland, New Jersey, bull, "Prince of Wales, 20th," four years, second premium,	40 00
J. B. Longnecker, Union Deposit, Pennsylvania, bull, "Cole's Puritan, 3rd," four years, third premium, ...	20 00
Joseph Hilton, New Scotland, New Jersey, bull, "Prince Taurus," two years, first premium, . . .	50 00
A. F. Bronson, Vernon, New York, bull, "Westhose," two years, second premium, . .	25 00
J. B. Longnecker, Union Deposit, Pennsylvania, bull, "Joe Cosgram," one year, first premium, .	30 00
Banker Brothers, Franklin Forks, Pennsylvania, bull, "Lake Prize," one year, second premium, ...	20 00
R. Hankinson, Mt. Holly, New Jersey, bull, "Culmination," one year, third premium, ...	10 00
Banker Brothers, Franklin Forks, Pennsylvania, cow, "Bright Promise," four years, first premium, ...	50 00
A. F. Bronson, Vernon, New York, cow, "Victoria," four years, second premium, ...	25 00
Joseph Hilton, New Scotland, New Jersey, cow, "Edith 4th," four years, third premium, ...	10 00
B. Hankinson, Mt. Holly, New Jersey, cow, "Bell," four years, third premium, ...	15 00
J. B. Longnecker, Union Deposit, Pennsylvania, cow, "Clever," three years, first premium	35 00
Banker Brothers, Franklin Forks, Pennsylvania, cow, "Effie Rose," three years, second premium, ...	20 00
A. F. Bronson, Vernon, New York, cow, "Red Bud," Highly commended.	
Joseph Hilton, New Scotland, New Jeasey, heifer, "Maid of Utica," two years, first premium	25 00
A. F. Bronson, Vernon, New York, heifer, "Countess of Camaby," two years, second premium, ...	15 00
B. Hankinson, Mt. Holly, New Jersey, heifer, "Twilight," two years, third premium, ...	10 00
J. B. Longnecker, Union Deposit, Pennsylvania, heifer, "Blood, Royal," one year, first premium	20 00
A. F. Bronson, Vernon, New York, heifer, "Hazel Kirke," one year, second premium, ...	10 00
Joseph Hilton, New Scotland, New Jersey, heifer, "Princess of Wales," one year, third premium.	5 00

Heifer, " Henrietta H.,"	Highly commended.
Banker Brothers, Franklin Forks, Pennsylvania, bull, " Prince of Wales 19th," first premium,	$[illegible]0 00
Banker Brothers, Franklin Forks, Pennsylvania, best cow, first premium,	50 00
Joseph Hilton, New Scotland, New Jersey, herd, first premium,	100 00
J. B. Longnecker, Union Deposit, Pennsylvania, herd, second premium,	50 00

In awarding the above premiums, the committee found the competition very close, and the placing of the awards difficult. We doubt if this class was ever better represented at any exhibition of the Society.

J. C. THORNTON,
J. S. KELLER,
J. D. NEVIUS.

CLASS 10—HOLSTEINS.

Roberts, Durnall & Hicks, West Chester, Pennsylvania, bull, " Jacob," three years, first premium,	$75 00
H. W. Austin, Woodstown, New Jersey, bull, "Oppendoes," four years, second premium	40 00
James L. Henderson, Washington, Pennsylvania, bull, " McKean," three years, third premium,	20 00
Bull, " Shadeland Prince," three years,	Diploma.
Pennsylvania Stock Breeders' Association, bull, " Movie Syoerd," two yeasr, first premium,	50 00
Lackawanna Breeders' Association, Pennsylvania, bull, " Rogers," two years, second premium,	25 00
James L. Henderson, Washington, Pennsylvania, bull, " Cornelius," two years, third premium,	15 00
W. M. Singerly, Gwynedd, Pennsylvania, bull, " Prince David," two years,	Diploma.
Lackawanna Breeders' Association, Pennsylvania, bull, " Dudley," one year, first premium,	30 00
W. M. Singerly, Gwynedd, Pennsylvania, bull, " Netherland Courtier," one year, second premium,	20 00
Roberts, Durnall & Hicks, bull, " Pel, 7th," one year, third premium,	10 00
W. M. Singerly, Gwynedd, Pennsylvania, cow, "Angeal," four years, first premibm,	50 00
Roberts, Durnall & Hicks, cow, " Vogeltie," six years, second premium,	25 00
Roberts, Durnall & Hicks, cow, " Wadman," six years, third premium,	15 00
Pennsylvania Stock-Breeders' Association, cow, " EmmaKramer."	Diploma.
H. W. Austin, Woodstown, New Jersey, cow, " Getana," three years, first premium,	35 00
Roberts, Durnall & Hicks, cow, " Tajalling, 2nd," three years, second premium,	20 00
W. M. Singerly, " Clarice S.," three years,	10 00
Lackawanna Breeders' Association, Pennsylvania, heifer, " Pride of Lackawanna," two years, first premium,	25 00
W. M. Singerly, heifer, " Cora S.," two years, second premium,	15 00
Roberts, Durnall & Hicks, heifer, " Joapjie, 2d," two years, third premium,	10 00

Roberts, Durnall & Hicks, heifer, "Pietje Joma," 3d, two years,	Diploma
G. L. G. Blessing, Springdale, New Jersey, heifer, "Favorite," one year, first premium,	$20 00
H. W. Austin, heifer, "Telka Austin, 2d," one year, second premium,	10 00
Lackawanna Breeders' Association, Pennsyluania, heifer, "Tullia, 2d," one year, third premium,	5 00
Lackawanna Breeders' Association, Pennsylvania, "Delner," one year,	Diploma.
Pennsylvania Stock-Breeders' Association, best bull, first premium,	50 00
W. M. Singerly, best cow, first premium,	50 00
Roberts, Durnall & Hicks, herd, first premium.	100 00
W. M. Singerly, herd, second premium.	50 00

The committee on Holstein cattle would make the above report.

James Miles,
James Neilson,
Abner Rutherford.
Committee.

CLASS 11—AYRSHIRES.

William Fairweather, McLane, Pennsylvania, bull, "Dunkeld," three years, first premium,	$75 00
William Lindsay, Elizabeth, New Jersey, bull, "Marduff of Orwell," three years, second premium	40 00
J. O. Magie & Sons, Elizabeth, New Jersey, bull, "Lamur, 11th," five years, third premium,	20 00
William Fairweather, McLane, Pennsylvania, bull, "Daisy King," two years, first premium,	50 00
William Lindsay, Elizabeth, New Jersey, bull, "Queen's Own," two years, second premium,	25 00
William Lindsay, Elizabeth, New Jersey, bull, "King Wells," one year, first premium.	30 00
J. O. Magie & Sons, Elizabeth, New Jersey, bull, "Lancer 13th," one year, second premium,	20 00
William Lindsay, Elizabeth, New Jersey, cow, "Vinnie," four years, first premium,	50 00
J. O. Magie & Sons, Elizabeth, New Jersey, cow, "Dolly Gray," six years, second premium,	25 00
J. O. Magie & Sons, Elizabeth, New Jersey, cow, "Marigold," four years, third premium,	15 00
J. O. Magie & Sons, Elizabeth, New Jersey, cow, "Lady Clarinda, 2d," three years, first premium	35 00
William Lindsay, Elizabeth, New Jersey, cow, "Mrs. Twinney," three years, second premium,	20 00
J. O. Magie & Sons, Elizabeth, New Jersey, heifer, "Dolly Dot," two years, first premium,	25 00
William Lindsay, Elizabeth, New Jersey, heifer, "Thistle," two years second premium,	15 00
William Fairweather, McLane, Pennsylvania, heifer, "Georgena," two years, third premium,	10 00
William Lindsay, Elizabeth, New Jersey, heifer, "Queen's Pet," one year, first premium,	20 00
William Fairweather, McLane, Pennsylvania, best bull, first premium,	50 00
William Lindsay, Elizabeth, New Jersey, best cow, first premium,	50 00

William Lindsay, Elizabeth, New Jersey, herd, first premium,	$100 00
J. O. Magie & Sons, Elizabeth, New Jersey, herd, second premium,	50 00

Your committee on Ayrshires beg leave to submit the foregying report: There were but three herds shown, each having very good animals in the aged classes, but in the younger class many were inferior, and in a few cases unworthy of a premium.

J. C THORNTON,
J. S. KELLER,
J. D. NEVIUS,
GEORGE BLIGHT.

CLASS 12—JERSEYS.

J. & C. Ramsden, Morton, Pennsylvania, bull, "Duke of Cloverdale," three years, first premium,	$75 00
Samson Kirkpatrick, Mt. Pleasant, Philadelphia, bull, "Upsoar," four years, second premium,	40 00
J. W. Mercur, Wallingford, Pennsylvania, bull, "Morgante," four years, third premium,	20 00
Jeremiah Ruth, Allentown, Pennsylvania, bull, "Black Prince of Linden," three years.	Highly commended.
Samson Kirkpatrick, Mt. Pleasant, Philadelphia, bull, "Duke of Springside," two years, first premium,	50 00
George Fox, Torresdale, Pennsylvania, bull, "Bessus," one year, first premium,	30 00
Charles Richardson, Shoemakertown, Pennsylvania, bull, "Falka's Princess," one year, second premium,	20 00
J. H. Burgin, Germantown, Pennsylvania, bull, "Gildflower," one year, third premium,	10 00
J. & C. Ramsden, Morton, Pennsylvania, bull, "Khedive's Noble," one year,	Highly commended.
J. & C. Ramsden, Morton, Pennsylvania, cow, "Princess of Ashantee," six years, first premium,	50 00
Jeremiah Ruth, Allentown, Pennsylvania, cow, "Regina's Pride," four years, second premium,	25 00
J. & C. Ramsden, Morton, Pennsylvania, cow, "Royal Beauty," six years, third premium,	15 00
Jeremiah Ruth, Allentown, Pennsylvania, cow, "Dom Pedro's Phœbe," six years,	Highly commended.
J. & C. Ramsden, Morton, Pennsylvania, cow, "Granny's Gem," three years, first premium,	35 00
Charles Richardson, Shoemakertown, Pennsylvania, cow, "Falka," three years, second premium,	20 00
Jeremiah Ruth, Allentown, Pennsylvania, cow, "Cicero's Fender," three years, third premium,	10 00
Jeremiah Ruth, Allentown, Pennsylvania, cow, "Phoanore," three years,	Highly commeneed.
J. & C. Ramsden, Morton, Pennsylvania, heifer, "Kaffee's Topeka," first premium,	25 00
J. W. Mercur, Wallingford, Pennsylvania, heifer, "Brincanta," two years, second premium,	15 00
Jeremiah Ruth, Allentown, Pennsylvania, heifer, "Distinction," two years, third premium,	10 00
J. & C. Ramsden, Morton, Pennsylvania, heifer, "Severa, 3d," one year, first premium,	20 00

J. & C. Ramsden, Morton, Pennsylvania, heifer, "Rose of Cloverdale," one year, second premium,	$10 00
Jeremiah Ruth, Allentown, Pennsylvania, heifer, "Lady Copley," one year, third premium,	5 00
J. & C. Ramsden, Morton, Pennsylvania, heifer, "Kaffee's Medusa," one year,	Highly commended.
J. & C. Ramsden, Morton, Pennsylvania, best bull, first premium,	50 00
J. & C. Ramsden, Morton, Pennsylvania, best cow, first premium,	50 00
J. & C. Ramsden, Morton, Pennsylvania, herd, first premium,	100 00
Jeremiah Ruth, Allentown, Pennsylvania, herd, second premium,	50 00

CLASS 13—Guernseys.

William Lindsay, Elizabeth, New York, bull, "Oscar," three years, second premium,	40 00
William Lindsay, Elizabeth, New York, bull, "Hard Times," one year, second premium,	20 00

J. I. Bishop,
Henry Palmer,
Louis M. Lusson.

CLASS 14—Herefords.

H. O. McKnight & Son, Locust Hill, Pennsylvania, bull, "Edwards," three years, first premium,	$75 00
G. W. Milliken, Youngstown, Ohio, bull, "Leotard," two years, first premium,	50 00
H. O. McKnight & Son, Locust Hill, Pennsylvania, bull, "Beefy Judge," one year, first premium,	30 00
G. W. Milliken, Youngstown, Ohio, bull, "Jim Blaine," one year, second premium,	20 00
H. O. McKnight & Son, Locust Hill, Pennsylvania, cow, "Queen of the East," four years, first premium,	50 00
H. O. McKnight & Son, Locust Hill, Pennsylvania, cow, "Miss Filly," six years, first premium,	25 00
G. W. Milliken, Youngstown, Ohio, cow, "Vulture," three years, first premium,	35 00
John Crane, Union, New Jersey, cow, "Dorothy Vernon, 2d," three years, second premium,	20 00
G. W. Milliken, Youngstown, Ohio, heifer, "Jessamine," two years, first premium,	25 00
John Crane, Union, New Jersey, heifer, "Queen of Athens, 2d," two years, second premium,	15 00
G. W. Milliken, Youngstown, Ohio, heifer, "Mabel," one year, first premium,	20 00
H. O. McKnight, Locust Hill, Pennsylvania, heifer, "Marion," one year, second premium,	10 00
G. W. Milliken, Youngstown, Ohio, best bull, first premium,	50 00
H. O. McKnight & Son, Locust Hill, Pennsylvania, best cow, first premium,	50 00
G. W. Milliken, Youngstown, Ohio, herd, first premium,	100 00
H. O. McKnight, Locust Hill, Pennsylvania, herd, second premium,	50 00
Benton Garringer, Washington C. H., Ohio, polled cattle, (Aberdeen,) one herd, first premium,	150 00

Mr. Benton Garringer exhibited a beautiful herd of Aberdeen polled cattle. He has no competition, but the animals are fine and justly entitled to the award of $150 offered for other recognized breeds.

George Blight,
David H. Branson.

GROUP III.—Sheep.

CLASS 17—Merinos and Delaines.

James Glass, Burgettstown, Pennsylvania, ram, three years, first premium, ...	$30 00
Alex. McCalmont, Hickory, Pennsylvania, ram, three years, second premium, . .	20 00
J. G. Paxton & Sons, Houstonville, Pennsylvania, ram, two years, first premium,	20 00
James Glass, Burgettstown, Pennsylvania, ram, two years, second premium,	10 00
Alex. McCalmont, Hickory, Pennsylvania, ram, one year, first premium,	15 00
J. G. Paxton & Son, Burgettstown, Pennsylvania, ram, one year, second premium,	10 00
Alex. McCalmont, Hickory, Pennsylvania, ram lamb, first premium,	10 00
James Glass, Burgettstown, Pennsylvania, ram lamb, second premium,	5 00
James Glass, Burgettstown, Pennsylvania, pen of three ewes, three years, first premium, ...	25 00
Alex. McCalmont, Hickory, Pennsylvania, pen of three ewes, three years, second premium, ...	20 00
Alex. McCalmont, Hickory, Pennsylvania, pen of three ewes, over two and under three years, first premium, ...	20 00
James Glass, Burgettstown, Pennsylvania, pen of three ewes, over two and under three years, second premium, . . .	15 00
James Glass, Burgettstown, Pennsylvania, pen of three ewes, one year and under two, first premium, ...	15 00
Alex. McCalmont, Hickory, Pennsylvania, pen three ewes, one year and under two, second premium, ...	10 00
Alex. McCalmont, Hickory, Pennsylvania, pen three ewe lambs, first premium, ...	10 00
James Glass, Burgettstown, Pennsylvania, pen three ewe lambs, second premium, ...	5 00
James Glass, Burgettstown, Pennsylvania, Merino sweepstakes, first premium, ...	40 00
J. G. Paxton, Houstonville, Pennsylvania, five fat Merinos, first premium, ...	20 00

Mr. President and Gentlemen of the Executive Committee:

The committee, in making their report on all classes of sheep, would recommend that each different breed be put in a class by itself, as the difference in size and quality is very embarrassing to your committee. We found in all classes as fine a lot of pure-bred and well-grown sheep as can be shown at any fair.

J. C. Thornton,
J. D. Kirkpatrick.
Wm. Shireman
Jury.

CLASS 18—Middle Wooled—Southdowns.

W. C. & L. R. Andrew, ewe lamb, first premium,	$10 00
John K. Cope, ewe lamb, second premium,	5 00
Lackawanna Breeders' Association, Pennsylvania,ram, two years and over, Shropshire, first premium,	30 00
James Roth, Allentown, Pennsylvania, ram, two years and over, Oxford, second premium,	20 00
William Hornward, ram, one year and under two, Hampshire, first premium,	20 00
Lackawanna Breeders' Association, Pennsylvania, ram, one year and under two, Shropshire, second premium,	15 00
James Wood, ram lamb, first premium,	15 00
William Hornward, ram lamb, second premium,	10 00
Lackawanna Breeders' Association, Pennsylvania, pen three ewes, two years and over, first premium,	25 00
C. M. Walter, pen of three ewes, two years and under, second premium,	20 00
C. M. Walter, pen three ewes, one year and under two, first premium,	20 00
James Wood, pen three ewes, one year and under two, second premium,	15 00
James Wood, pen ewe lambs, first premium,	20 00
Lackawanna Breeders' Association, pen ewe lambs, second premium,	15 00
W. D. & L. C. Anderson, sweepstakes,	40 00
William Galbraith, five fat middle wooled, first premium,	20 00

CLASS 19—Long Wooled, Lincolns, Cotswolds, Leicesters.

T. P. Dickson, Clark, Mercer county, Pennsylvania, ram, two years and over, Cotswold, first premium,	30 00
Edward Hicks, Goshenville, Pennsylvania, ram, two years and over, Cotswold, second premium,	20 00
C. M. Walter, ram, one year and over, first premium,	20 00
T. P. Dickson, ram, one year and over, Cotswold, second premium	15 00
Edward Hicks, ram lamb, Cotswold, first premium,	15 00
C. M. Walter, ram lamb, Lincoln, second premium,	10 00
Edward Hicks, pen three ewes, two years and over, Cotswold, first premium,	25 00
C. M. Walter, pen three ewes, two years and over, Lincoln, second premium,	20 00
T. P. Dickson, pen ewes, one year and over, Cotswold, first premium,	20 00
Edward Hicks, pen ewes, one year and over, Cotswold, second premium,	15 00
C. M. Walter, pen three lambs, Lincoln, first premium,	20 00
T. P. Dickson, pen three lambs, Cotswold, second premium,	15 00
C. M. Walter, first sweepstakes,	20 00
T. P. Dickson, first sweepstakes,	20 00
T. P. Dickson, five fat long wooled sheep, first premium,	20 00

GROUP IV.—Swine.

CLASS 21—Chesters.

E. B. Ashbridge, boar, over one year, first premium,	20 00
C. M. Walter, boar, over one year, second premium,	15 00
Richard Dutton, boar, under one year, first premium,	15 00

E. B. Ashbridge, boar, under one year, second premium,	$10 00
C. M. Walter, sow, over two years, first premium,	20 00
Richard Dutton, sow, over two years, second premium,	15 00
Richard Dutton, sow, over one year, first premium,	15 00
C. M. Walter, sow, over one year, second premium,	10 00
Richard Dutton, sow, under one year, first premium,	10 00
E. B. Ashbridge, sow, under one year, second premium,	5 00
C. M. Walter, pen five sows, under one year, first premium,	20 00
Richard Dutton, pen five sows, under one year, second premium,	15 00
Richard Dutton, pen of five sows, under six months, first premium,	15 00
C. M. Walter, pen of five sows, under six months, second premium,	10 00
* E. B. Ashbridge, boar, over two years, first premium,	30 00
* C. M. Walter, boar, over two years, second premium,	10 00
* Richard Dutton, boar, over two years, second premium,	10 00

* The committee, being called on to review these entries, after a careful comparison of the boars shown, feel constrained to award first premium to E. B. Ashbridge, and divide second premium between Dutton and Walter.

CLASS 24—JERSEY REDS.

Richard Dutton, sow, over one year, second premium,	10 00
Richard Dutton, sow, over one year, second premium,	5 00

CLASS 25—YORKSHIRES.

J. G. Paxton & Son, best boar, two brood sows, and twelve of his get, first premium,	Silver medal.
J. G. Paxton & Son, boar, over two years, first premium,	30 00
J. G. Paxton & Son, boar, over one year, first premium,	20 00
John C. Comfort, boar, over one year, second premium,	15 00
J. G. Paxton & Son, sow, over two years, first premium,	20 00
John C. Comfort, sow, over two years, second premium,	15 00
J. G. Paxton & Son, sow, over one year, first premium,	15 00
John C. Comfort, sow, over one year, second premium,	10 00
J. G. Paxton & Son, sow, under one year, second premium,	5 00
J. G. Paxton & Son, pen of sows, under six months, first premium,	15 00

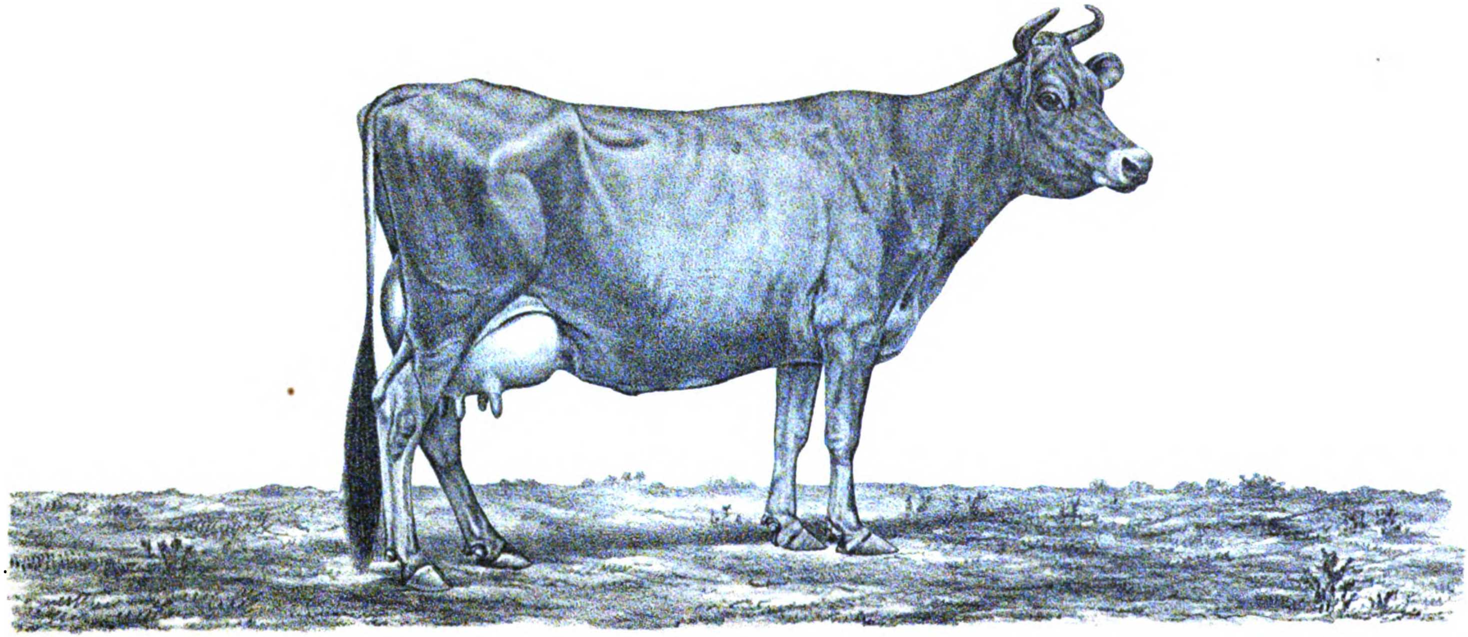
Mr. President and Gentlemen of the Executive Committee:

In making the foregoing awards, your committee found such general excellence in general points displayed in breeding the various herds that it was with difficulty they were able to come to a conclusion. The merits, generally, were so evenly balanced that it was with difficulty that a unanimous decision could be reached in all classes.

J. D. KIRKPATRICK
J. C. THORNTON,
WM. SHIREMAN,
Jury.

CLASS 28—CHESHIRES.

Coe Bros., best boar, two brood sows, and twelve of his get, first premium,	Silver medal.
Freeman & Button, boar, over two years, first premium,	$30 00
Coe Bros., boar, over two years, second premium,	20 00
Gilbert S. Button, boar, over one year, first premium,	20 00
Coe Bros., boar, over one year, second premium,	15 00



"ROYAL BEAUTY," 18908.

Owned by J. V. & C. Ramsden, Morton, Pa. First Prize, 1885. From instantaneous photograph by Schreiber & Sons, Philadelphia.

Gilbert S. Button, boar, under one year, first premium,	$15 00
Coe Bros., boar, under one year, second premium,	10 00
Gilbert S. Button, sow, over two years, first premium,	20 00
Freeman & Button, sow, over two years, second premium,	10 00
Coe Bros., sow, over one year, first premium,	15 00
Gilbert S. Button, sow, over one year, second premium,	10 00
Freeman & Button, sow, under one year, first premium,	10 00
Gilbert S. Button, sow, under one year, second premium,	5 00
Coe Bros., pen of five sows, over six months, first premium,	20 00
Freeman & Button, pen of five sows, under six months, second premium,	15 00

CLASS 22—BERKSHIRES.

John C. Comfort, brood sow, over two years, first premium,	20 00
Caleb M. Walter, brood sow, over two years, second premium,	15 00
Caleb M. Walter, sow, over one year, first premium,	15 00
John C. Comfort, sow, over one year, second premium,	10 00
Caleb M. Walter, sow, under one year, first premium,	10 00
John C. Comfort, sow, under one year, second premium,	5 00
Caleb M. Walter, pen of five sows, under six months, first premium,	15 00

CLASS 23—POLAND CHINAS.

John C. Comfort, best boar, two brood sows, twelve of his get, first premium,	Silver medal.
D. H. Branson, boar, over two years, first premium,	30 00
John C. Comfort, boar, over two years, second premium,	20 00
Edward Hicks, boar, over one year, first premium,	20 00
Richard Dutton, boar, over one year, second premium,	15 00
Richard Dutton, boar, under one year, first premium,	15 00
D. H. Branson, boar, under one year, second premium,	10 00
Edward Hicks, sow, over two years, first premium,	20 00
Richard Dutton, sow, over two years, second premium,	10 00
Edward Hicks, sow, over one year, first premium,	15 00
Richard Dutton, sow, over one year, second premium,	10 00
D. H. Branson, sow, under one year, first premium,	10 00
Edward Hicks, sow, under one year, second premium,	10 00
Richard Sutton, pen of five sows, over six months, first premium,	20 00
D. H. Branson, first pen of five sows, under six months, premium,	15 00

CLASS 26—ESSEX.

John C. Comfort, boar, two brood sows, twelve of his get, first premium,	Silver medal.
John C. Comfort, boar, over two years, first premium,	30 00
John C. Comfort, boar, over one year, first premium,	20 00
John C. Comfort, boar, under one year, first premium,	15 00
John C. Comfort, sow, over two years, first premium,	20 00
John C. Comfort, sow, over one year, first premium,	10 00

GROUP V.—Poultry and Furbearing Pets.

CLASS 29.—GALLINACEOUS.

Light Brahmas.

George Purdu, East Orange, New Jersey, first breeding pen,	5 00
" " " " first hen,	3 00
" " " " first cockerel,	3 00
" " " " first pullet,	3 00

J. A. Roberts, Malvern, Pennsylvania, first hen,	$3 00
W. M. Ward, second breeding pen,	3 00
" second cockerel,	2 00
George Purdu, East Orange, New Jersey, second cock,	2 00
J. A. Roberts, Malvern, Pennsylvania, second hen,	2 00
W. M. Ward, hen,	H. C.
" pullet,	H. C.
George Purdu, East Orange, New Jersey, cockerel,	H. C.
J. A. Roberts, Malvern, Pennsylvania, third pullet,	2 00
Richard Young, Morton, Pennsylvania, cock,	H. C.

Dark Brahmas.

Newton Adams, Utica, New York, first breeding pen,	5 00
" " " " first cock,	3 00
" " " " first hen,	3 00
" " " " first cockerel,	3 00
" " " " first pullet,	3 00
John Lilly, Lambertville, New Jersey, second breeding pen,	3 00
" " " second cockerel,	2 00
J. S. Holcomb & Co., Lambertville, New Jersey, second breeding pen,	3 00
" " " " second hen,	2 00
Newton Adams, Utica, New York, second hen,	2 00
" " " second hen,	2 00
John Lilly, Lambertville, New Jersey, pullet,	H. C.
Newton Adams, Utica, New York, cockerel,	H. C.
C. A. Reid, cock,	H. C.
H. B. & A. F. Bancroft, third breeding pen,	2 00

Buff Cochins.

J. S. Holcomb, cockerel,	H. C.
C. A. Reid, pullet,	H. C.
Richard Young, cock,	H. C.
" " hen,	H. C.

White Cochins.

W. J. Baldwin, Downingtown, Pennsylvania, first breeding pen,	$5 00
" " " first hen,	3 00
" " " first cockerel,	3 00
" " " first pullet,	3 00
" " " first cock,	3 00
" " " second breeding pen,	3 00
" " " second cock,	2 00
" " " second pullet,	2 00
" " " second cockerel,	2 00
" " " second hen,	2 00
" " " cockerel,	H. C.
" " " pullet,	H. C.
J. S. Holcomb & Co., hen,	H. C.

Black Cochins.

C. A. Reid, first breeding pen,	5 00
" first hen,	3 00
" first pullet,	3 00
" second breeding pen,	3 00

C. A. Ried, second cock,	$2 00
" second cockerel,	2 00
" second pullet,	2 00
" cock,	H. C.
" cockerel,	H. C.

Partridge Cochins.

Charles Hewett, Trenton, New Jersey, first hen,	3 00
S. H. Jackson, Philadelphia, first pullet,	3 00
Brown Bro., Glen Cove, Long Island, first cockerel,	3 00
J. A. Stovell, Philadelphia, first breeding pen,	5 00
" " first cock,	3 00
Charles Hewett, Trenton, New Jersey, second hen,	2 00
Brown Bro , Glen Cove, Long Island, second cockerel,	2 00
" " " second pullet,	2 00
Richard Young, Morton, Pennsylvania, second cock,	2 00
" " " second breeding pen,	3 00
T. Ross, Norristown, Pennsylvania, breeding pen,	H. C.
S. H. Jackson, Philadelphia, third breeding pen,	2 00
" " cockerel,	H. C.
Brown Bro., Glen Cove, Long Island, pullet	H. C.
Richard Young, Morton, Pennsylvania, hen,	H. C

Langshans.

T. A. Mortimer, Pottsville, Pennsylvania, first cockerel,	3 00
J. H. Downing, Downingtown, Pennsylvania, first breeding pen,	5 00
Charles T. Thomas, Whitford, Pennsylvania, first pullet,	3 00
" " " first cock,	3 00
" " " first hen,	3 00
J. H. Downing, Downingtown, Pennsylvania, second pullet,	2 00
Charles T. Thomas, Whitford, Pennsylvania, second breeding pen,	3 00
" " " second cockerel,	2 00
B. F. Lewis, Gwynedd, Pa., second hen,	2 00
Richard Young, second cock,	2 00
J. S. Cope, second breeding pen,	2 00
John W. Croskey, Swarthmore, Pennsylvania, cock,	H. C.
T. A. Mortimer, Pottsville, Pennsylvania, pullet,	H. C.
Robert Seaman, Jericho, New York, breeding pen,	H. C.
Charles T. Thomas, Whitford, Pennsylvania, cockerel,	H. C.
J. F. Sellers, Pottstown, Pennsylvania, hen,	H. C.

Black Javas.

R. Vanderhover, Rahway, New Jersey, first cock,	3 00
C. A. Reid, second hen,	2 00
" second pullet,	2 00
" cockerel,	H. C.
" pullet,	H. C.
" cock,	H. C.

Mottled Javas.

C. A. Reid, first breeding pen,	5 00
" first cock,	3 00
" first cockerel,	3 00

C. A. Reid, first pullet,	$3 00
" second cock,	2 00
" second hen,	2 00
" second cockerel,	2 00
" hen,	H. C.
" pullet,	H. C.

Dominiques.

Jesse G. Darlington, Philadelphia, first breeding pen,	5 00
" " first cock,	3 00
" " first hen.	3 00
" " first cockerel,	3 00
" " first pullet,	3 00
" " second cockerel,	2 00
C. A. Reid, second cock,	2 00
Jesse G. Darlington, Philadelphia, pullet,	H. C

Plymouth Rocks.

G. W. McCracken, first breeding pen,	5 00
" first cock,	3 00
" first cockerel,	3 00
" first pullet,	3 00
" hen.	
" second breeding pen,	3 00
" second hen,	2 00
Lin. G. Thomas, Pine Iron Works, Pennsylvania, second pullet,	2 00
" " " " second cockerel,	2 00
C. A. Reid, second cock,	2 00
George L. Gillingham, Morristown, Pennsylvania, cock,	H. C
Lin. G. Thomas, Pine Iron Works, Pennsylvania, third breeding pen,	2 00
G. W. McCracken, pullet,	H. C.
J. F. Sellers, hen,	H. C.
Walter C. Miller, Allentown, Pennsylvania, breeding pen,	H. C.
Model Bee Hive Company, cockerel,	H. C.
" " " " pullet,	H. C.

Wyandottes.

Charles T. Thomas, first breeding pen,	5 00
" first cockerel,	3 00
" first pullet,	3 00
A. P. Groves, second cock,	2 00
J. H. Downing, second breeding pen,	3 00
" second cockerel,	2 00
" second pullet,	2 00
Mrs. Jennie P. Hellings, Jenkintown, Pennsylvania, second hen,	2 00
Winson M. Ward, Peabody, Massachusetts, third breeding pen,	2 00
H. B. & A. T. Bancroft, hen,	H. C.
Charles T. Thomas, H. C. cockerel, pullet,	H. C.
Mrs. Jennie P. Hellings, Jenkintown, Pennsylvania, cock,	H. C.

Black Hamburgs.

Thomas Schofield, Paschall, Philadelphia, first breeding pen,	$5 00
" " " first cock.	3 00
" " " second breeding pen,	3 00
" " " second cockerel,	2 00
" " " second pullet,	2 00
G. H. Hartman, Ferndale, Pennsylvania, first pullet,	3 00
" " " second cock,	2 00
C. A. Reid, second hen,	2 00
F. N. Hartman, Ferndale, Pennsylvania, hen	H. C.
" " " third breeding pen,	2 00
Mrs. Jennie P. Hellings, cock,	H. C.

Silver Penciled Hamburgs.

Thomas Schofield, Paschall, Philadelphia, first cockerel,	3 00
" " " first pullet,	3 00
" " " second cockerel,	2 00
" " " pullet,	H. C.

Golden Spangled Hamburgs.

Richard Young, first cock,	3 00
Richard Young, first hen,	3 00
Mrs. Jennie P. Hellings, second cock,	2 00
Mrs. Jennie P. Hellings, second hen,	2 00

Silver Spangled Hamburgs.

C. A. Reid, first hen,	3 00
" second breeding pen,	3 00
" second cock,	2 00
B. F. Lewis, second hen,	2 00
B. F. Lewis, second pullet,	2 00
C. A. Reid, pullet,	H. C.
B. F. Lewis, cock,	H. C.
B. F. Lewis, third breeding pen,	2 00

Golden Penciled Hamburgs.

Richard Young, first cock,	3 00
John Stewart, first breeding pen,	5 00
" first cock,	3 00
" first pullet,	3 00
" second hen,	2 00
Richard Young, hen.	H. C.

White Leghorns.

Knapp Bros., Fabrino, New York, first breeding pen,	5 00
" " " first cock,	3 00
" " " first hen,	3 00
" " " first cockerel,	3 00
" " " first pullet,	3 00
George Fox, second cockerel,	2 00
Mrs. Rachel C. Hawkins, Lansdale, Pennsylvania, second hen,	2 00

Knapp Brothers, second breeding pen,	$3 00
" " second cockerel,	2 00
George Fox, third breeding pen,	2 00
Dr. J. W. King, hen,	H. C.
" " cockerel,	H. C.

Andalusian.

C. A. Reid, first breeding pen,	5 00
" first cock,	3 00
" first hen,	3 00
" second hen,	2 00

Brown Leghorn.

Thomas Powell, first breeding pen,	5 00
" first pullet,	3 00
" first cock,	3 00
Richard Young, first cockerel,	3 00
Button Brothers, Chittenango, New York, first pullet,	3 00
Thomas Powell, second cockerel,	2 00
C. A. Reid, second breeding pen,	3 00
Richard Young, second hen,	2 00
Button Brothers, Chittenango, New York, second cockerel,	2 00
R. Vanderhower, cockerel,	H. C.
Thomas Powell, pullet,	H. C.
" " hen,	H. C.
C. A. Reid, cock,	H. C.
James Beatty, Lansdowne, Pennsylvania, pullet,	H. C.

Black Leghorn.

Charles Hewett, Trenton, New Jersey, first breeding pen,	5 00
" " " first cockerel,	3 00
" " " first cock,	3 00
" " " first pullet,	3 00
B. S. Coombs, first hen,	3 00
" second cockerel,	2 00
" second pullet,	2 00
Charles Hewett, Trenton, New Jersey, second breeding pen,	3 00
" " " second hen,	2 00
" " " hen,	H. C.
" " " pullet,	H. C.
H. F. Alling, hen,	H. C.
B. S. Coombs, third breeding pen,	2 00

Dominique Leghorns.

William Mooser, Allentown, Pennsylvania, first cockerel,	3 00
" " " first pullet,	3 00
" " " second cockerel,	2 00
" " " second pullet,	2 00

White Faced Black Spanish.

John Stewart, first pullet,	3 00
Thomas Powell, first breeding pen,	5 00
" first cock,	3 00

Thomas Powell, first hen,	$3 00
" first cockerel,	3 00
" second cock,	2 00
" second hen,	2 00
" second pullet.	2 00
John Stewart, second breeding pen,	3 00
" cock,	H. C.
B. F. Lewis, third breeding pen,	2 00
John Gross, hen,	H. C.

White Faced Black Spanish.

B. F. Lewis, second cockerel,	2 00
" pullet,	H. C.

Silver Gray Dorkings.

W. W. Wagner, Germantown, first breeding pen,	5 00
" " first cockerel,	3 00
" " first pullet,	3 00
" " first hen,	3 00
" " second hen,	2 00
" " second cockerel,	3 00
" " cock,	H. C.
" " pullet,	H. C.

Sumatras.

Belmont Perry, first breeding pen,	5 00
" first hen,	3 00
" first pullet,	3 00
" first cock,	3 00
" first cockerel,	3 00
" second cock,	2 00
" second hen,	2 00

Black Breasted Red Game.

Percival Roberts, Pencoyd, Pennsylvania, first cockerel,	3 00
T. K. Bennett, first pullet,	3 00
T. B. Dorsey, Ellicott City, Maryland, first cock,	3 00
" " " first breeding pen,	5 00
Percival Roberts, Pencoyd, Pennsylvania, second breeding pen,	3 00
T. K. Bennett, second cock,	2 00
James A. Stovell, second hen,	2 00
John Fanning, second cockerel,	2 00
T. B. Dorsey, second pullet,	2 00
James Milligan, third breeding pen,	2 00
" cockerel,	H. C
" pullet,	H. C.
Westerfelt, Haywood & Co., hen,	H. C.

Brown Breasted Red Game.

J. K. Bennett, first cock,	3 00
" first hen,	3 00
" first pullet,	3 00
Michael J. Gorman, Lambertville, New Jersey, first breeding pen,	5 00

J. K. Bennett, second breeding pen,	$3 00
Michael J. Gorman, Lambertville, New Jersey, second cock,	2 00
" " " second hen,	2 00
" " " second pullet,	2 00
" " " hen,	H. C.
" " " pullet,	H. C.

Tartar Pitt.

Michael J. Gorman, first hen,	3 00

White Game Bantams.

Westerfelt, Haywood & Co., first breeding pen,	5 00

Black Games.

H. H. Harris, Phillipsburg, New Jersey, first cock,	3 00
" " " first hen,	3 00
" " " first cockerel,	3 00
" " " first pullet,	3 00
" " " second cock,	2 00
" " " second hen,	2 00

White Games.

J. S. Cope, Germantown, first breeding pen,	5 00
" " first hen,	3 00
George Snyder, first cock,	3 00
B. C. Thomas, first cockerel,	3 00
" first pullet,	3 00
" first hen,	3 00
George Snyder, second breeding pen,	3 00
" second cock,	2 00
" second hen,	2 00
" second cockerel,	2 00
Michael J. Gorman, second pullet,	2 00
" cock,	H. C.
" cockerel,	H. C.
B. C. Thomas, hen,	H. C.

Golden Duckwing Game.

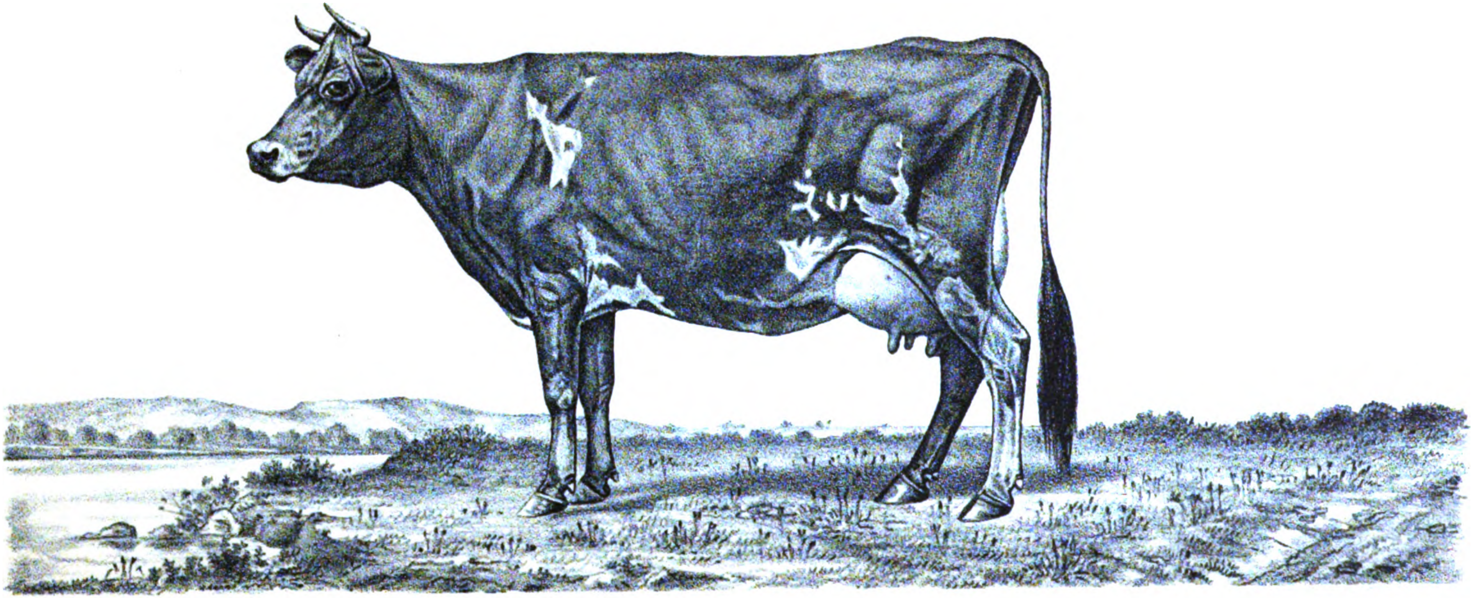
Westerfelt, Haywood & Co., first hen,	3 00
T. B. Dorsey, first cock,	3 00
" first pullet,	3 00
" second cockerel,	2 00
" second pullet,	2 00
" hen,	H. C.
" cockerel,	H. C.

Silver Duckwing Game.

T. B. Dorsey, first pullet,	3 00
" first hen,	3 00
J. C. Maple, first cockerel,	3 00

Red Pile Game.

J. K. Bennett, first breeding pen,	5 00
T. B. Dorsey, first pullet,	3 00



OXFORD KATE, 13646.

Record 39 pounds 12 ounces in 7 days. From instantaneous photograph by
Schreiber and Sons, Philadelphia.

B. C. Thornton, first cock,	$3 00
“ first hen,	3 00
Westerfelt, Haywood & Co., second cockerel,	2 00
J. K. Bennett, second cock,	2 00
T. B. Dorsey, second pullet,	2 00
“ second breeding pen,	3 00

White Pile Games.

T. B. Dorsey, first pullet,	3 00
“ second hen,	2 00
“ second cockerel,	2 00

Houdans.

Daniel Pinckney, Onondago, New York, first breeding pen,	5 00
“ “ “ “ first cock,	3 00
“ “ “ “ first hen,	3 00
“ “ “ “ first cockerel,	3 00
“ “ “ “ first pullet,	3 00
T. B. Dorsey, first cock,	3 00
“ first hen,	3 00
“ second hen,	2 00
John S. Cope, second cockerel,	2 00
Daniel Pinckney, second hen,	2 00
“ “ second cockerel,	2 00
“ “ second pullet,	2 00
A. P. Groves, second breeding pen,	3 00
John S. Cope, pullet,	H. C.
Daniel Pinckney, cockerel,	H. C.
Dutton Brothers, cock,	H. C.
“ “ hen,	H. C.
James Lightfoot, breeding pen,	H. C.

White Crested Black Polish.

A. B. Seymour, first cockerel,	3 00
“ first pullet,	3 00
Richard Young, first cock,	3 00
“ first breeding pen,	5 00
“ second hen,	2 00

Silver Crested Polish.

T. B. Dorsey, first cock,	3 00
“ first hen,	3 00
“ first pullet,	3 00
“ first breeding pen,	5 00
J. B. Thomas, first cockerel,	3 00
“ second pullet,	2 00
J. S. Holcomb & Co., second breeding pen,	3 00
“ “ second cock,	2 00
“ “ second hen,	2 00
“ “ second cockerel	2 00
“ “ breeding pen,	2 00
“ “ pullet,	H. C.
T. B. Dorsey, hen,	H. C.
“ cockerel,	H. C.

Golden-Crested Polish.

Richard Young, first cock,	3 00
John Stewart, first cockerel,	3 00
T. B. Dorsey, first hen,	3 00
“ first pullet,	3 00
“ first breeding pen,	5 00
Belmont Perry, first cockerel,	3 00
“ second pullet,	2 00
“ second cock,	2 00
“ second hen,	2 00
John Stewart, second hen,	2 00
“ second pullet,	2 00
“ second cock,	2 00
T. B. Dorsey, second cockerel,	2 00
John Stewart, cock,	H. C.
Belmont Perry, cock,	H. C.

Buff Polish.

Belmont Perry, first breeding pen,	5 00
“ first hen,	3 00
“ first pullet,	3 00
“ first cock,	3 00
“ first cockerel,	3 00
“ second cock,	2 00
“ second pullet,	2 00

Rumplers.

B. F. Lewis, first hen,	3 00
“ first cockerel,	3 00
“ first pullet,	3 00
“ second pullet,	2 00

Russians.

B. F. Koons, second cockerel,	2 00
“ second pullet,	2 00
“ cockerel,	H. C.
“ pullet,	H. C.

Silkies.

Belmont Perry, first breeding pen,	5 00
“ first cock,	3 00
“ first hen,	3 00
“ first cockerel,	3 00
“ first pullet,	3 00
“ second hen,	2 00
“ second cock,	2 00
Jesse M. Rook, cock,	H. C.
“ hen,	H. C.

Frizzled.

Belmont Perry, first cock,	3 00
“ first pullet,	3 00
B. F. Lewis, hen,	H. C.

Erminetts Furs.

J. P. Thomas, cockerel,	H. C.
“ “ pullet,	H. C.

Jersey Blue.

Mrs. Kate Y. Ash, first cock,	3 00
“ first hen,	3 00

Black-Breasted Red Game Bantams.

Westerfelt, Haywood & Co., first hen,	3 00
J. K. Bennett, first cock,	3 00
“ first cockerel,	3 00
“ first pullet,	3 00
“ first breeding pen,	5 00
“ second breeding pen,	3 00
Westerfelt, Haywood & Co., second cock,	2 00
I. D. Nevius, second cock,	2 00
“ second hen,	2 00
“ third breeding pen,	2 00
Westerfelt, Haywood & Co., cockerel,	H. C.
“ “ “ pullet,	H. C.
“ “ “ breeding pen,	H. C.
J. C. Maple, Trenton, New Jersey, cock,	H. C.
“ “ “ hen,	H. C.
J. R. Bennett, hen,	H. C.

Brown-Breasted Red Game Bantams.

Westerfelt, Haywood & Co., first cock,	3 00
“ first hen,	3 00
“ first breeding pen,	5 00
“ second hen,	2 00
T. B. Dorsey, second cockerel,	2 00

Red Pile Game Bantams.

J. Stewart, first breeding pen,	5 00
T. K. Bennett, first pullet,	3 00
Westerfelt, Haywood & Co., first cock,	3 00
“ first hen,	3 00
“ first cockerel,	3 00
“ second cockerel,	2 00
second pullet,	2 00
“ second cock,	2 00
T. B. Dorsey, second breeding pen,	3 00
T. K. Bennett, second hen,	2 00
“ cockerel,	H. C.
T. B. Dorsey, hen,	H. C.
J. Stewart, cock,	H. C.

White Pile Game Bantams.

J. K. Bennett, first cock,	3 00
T. B. Dorsey, first hen,	3 00
“ first pullet,	3 00
“ first breeding pen,	5 00

Westerfelt, Haywood & Co., first cockerel,	$3 00
T. B. Dorsey, second cockerel,	2 00
“ second pullet,	2 00
Westerfelt, Haywood & Co., second cockerel,	2 00
J. C. Maple, cock,	H. C.
“ hen,	H. C.
T. B. Dorsey, cock,	H. C.
“ hen,	H. C.

Silver Duckwing Game Bantams.

Jesse G. Darlington, first breeding pen,	5 00
“ “ first cock,	3 00
“ “ first pullet,	3 00
Westerfelt, Haywood & Co., first hen,	3 00
“ “ “ first cockerel,	3 00
Jesse G. Darlington, second hen,	2 00
“ “ second cockerel,	2 00
“ “ second pullet,	2 00
Mrs. Kate G. Ash, second cock,	2 00
J. C. Maple, second breeding pen,	3 00
“ cockerel,	H. C.
“ pullet,	H. C.
“ hen,	H. C.
Mrs. J. P. Hellings, cock,	H. C.

Golden Duckwing Game Bantams.

T. K. Bennet, first pullet,	3 00
T. B. Dorsey, first cock,	3 00
“ first breeding pen,	5 00
George Snyder, first cockerel,	3 00
Westerfelt, Haywood & Co., first hen,	3 00
T. K. Bennett, second cock,	2 00
“ second cockerel,	2 00
“ second pullet,	2 00
“ second breeding pen,	3 00
George Snyder, second hen,	2 00
T. K. Bennett, cockerel,	H. C.
T. B. Dorsey, hen,	H. C.

White Game Bantams.

Westerfelt, Haywood & Co., first cock,	3 00
“ “ “ first hen,	3 00
“ “ “ first cockerel,	3 00
“ “ “ first pullet,	3 00
“ “ “ second hen,	2 00
“ “ “ second cockerel,	2 00
“ “ “ second pullet,	2 00

Black Game Bantams.

Westerfelt, Haywood & Co., first hen,	3 00
“ “ “ first cockerel,	3 00
“ “ “ first pullet,	3 00
“ “ “ first breeding pen,	5 00
“ “ “ second cockerel,	2 00
“ “ “ second pullet,	2 00

Golden Sebright Bantams.

B. T. Koons, Allentown, Pennsylvania, first cockerel,	$3 00
" " " first pullet,	3 00
J. S. Holcomb & Co., first breeding pen,	5 00
" first cock,	3 00
" first hen,	3 00
Westerfelt, Haywood & Co., second hen,	2 00
J. C. Maple, second cock,	2 00
B. T. Koons, second breeding pen,	3 00
J. C. Maple, hen,	H. C.

Silver Sebright Game Bantams.

Belmont Perry, first breeding pen,	5 00
" first cock,	3 00
" first pullet,	3 00
" first cockerel,	3 00
" second pullet,	2 00
" second cockerel,	2 00
B. T. Koons, second breeding pen,	2 00
" second cock,	2 00
" cockerel,	H. C.
" pullet,	H. C.
Westerfelt, Haywood & Co., cock,	H. C.
" " " hen,	H. C.
Belmont Perry, hen,	H. C.

Black African Game Bantams.

Charles Lippold, first cock,	3 00
" first cockerel,	3 00
J. C. Maple, first breeding pen,	5 00
" first hen,	3 00
" first pullet,	3 00
" second cock,	2 00
Charles Lippold, second hen,	2 00
" second breeding pen,	3 00
" second pullet,	2 00
J. C. Maple, second cock,	2 00

White Rose Comb.

Westerfelt, Haywood & Co., first pullet,	3 00
J. C. Maple, first cock,	3 00
J. C Maple, first hen,	3 00
Westerfelt, Haywood & Co., second hen,	2 00

White Booted Bantams.

Westerfelt, Haywood & Co., first hen,	3 00

Pekin Bantams.

Westerfelt, Haywood & Co., first hen,	3 00
" " " first cockerel,	3 00
" " " first pullet,	3 00
John E. Deihl, Beverly, New Jersey, first breeding pen,	5 00
" " " first cock,	3 00
" " " first hen,	3 00

Belmont Perry, second breeding pen,	$3 00
" " " cock,	2 00
" " " hen,	2 00
" " " pullet,	2 00
C. P. Jordan, New Haven, Connecticut, second cockerel,	2 00
John E. Deihl, hen,	H. C.
Belmont Perry, cockerel,	H. C.

Japanese Bantams.

Belmont Perry, first breeding pen,	5 00
" " first cock,	3 00
" " first hen,	3 00
" " first cockerel,	3 00
" " first pullet,	3 00
B. F. Koons, second breeding pen,	3 00
" " cock,	2 00
" " hen,	2 00
" " cock,	2 00
" " pullet,	2 00
" cockerel,	H. C.
Belmont Perry, hen,	H. C.
" cock,	H. C.

White Polish Bantams.

Belmont Perry, first breeding pen,	5 00
" " first cock,	3 00
" " first hen,	3 00
" " first pullet,	3 00
" " first cockerel,	3 00
" " second hen,	2 00
" " second pullet,	2 00

California Quail.

H. W. Vahle, first one,	3 00

Capons.

J. M. Baldwin, first,	3 00
J. H. Downing, second,	2 00

Pearl Guineas.

B. F. Lewis, first pair,	3 00
B. F. Lewis, second pair,	2 00

White Guineas

B. F. Lewis, first pair,	3 00

Bronze Turkeys.

Charles A. Reid, first, one pair,	5 00
D. H. Branson, second, one pair,	3 00

Buff Turkeys.

Mrs. Kate Y. Ash, second, one pair,	3 00
C. A. Reid, first, one pair,	5 00

Black Turkeys.

C. A. Reid, first, one pair,	$5 00
C. A. Reid, second, one pair,	3 00

White Turkeys.

C. A. Reid, first, one pair,	5 00
C. A. Reid, second, one pair,	3 00
B. F. Lewis, one pair	H. C.

Slate Turkeys.

C. A. Reid, first, one pair,	5 00
D. H. Branson, second, one pair,	3 00

Narragansett Turkeys.

C. A. Reid, first, one pair,	5 00
C. A. Reid, second, one pair,	3 00

SUB-CLASS 29 *a*.—DRESSED POULTRY AND EGGS.

Best dozen of eggs.

Knapp Bros., first,	2 00
" second,	1 00

SUB-CLASS 29 *b*.—INCUBATORS, BROODERS AND APPLIANCES.

Andrews Hatching Co., Elmira, New York, first, Andrew Incubator,	25 00
James Rankin, South Easton, Massachusetts, second, Monarch Incubator,	15 00
Keystone Incubator, third, Incubator,	10 00

Brooders.

L. N. Clark & Son, first, Brooder,	5 00
Andrews Hatching Co., Elmira, New York, second, Brooder,	3 00

CLASS 30.—AQUATIC.

Embden Geese.

C. A. Reid, first, one pair,	3 00

Brown China.

C. A. Reid, first, one pair,	3 00

White China.

C. A. Reid, first, one pair,	3 00
B. F. Lewis, second, one pair,	2 00

Toulouse Geese.

B. F. Lewis, second, one pair,	2 00

Pekin Ducks.

George W. McCracken, first, one pair,	3 00
George L. Gillingham, Morristown, New Jersey, second, one pair,	2 00
" " " " one pair,	H. C.

Rouen Ducks.

George W. McCracken, first, one pair,	$3 00
George W. McCracken, second, one pair,	2 00

Aylesbury Ducks.

C. A. Reid, first, one pair,	3 00
Richard Young, second, one pair,	2 00

Cayuga Ducks.

C. A. Reid, first, one pair,	3 00
C. A. Reid, second, one pair,	2 00

CLASS 31.—PIGEONS AND CAGE AND ORNAMENTAL BIRDS.

H. W. Vahle, first mocking-bird,	1 00
" second mocking-bird,	50
" first bull-finch,	1 00
" second bull-finch,	50
" first parrot,	1 00
" second parrot,	50
" first gold-finch,	1 00
" second gold-finch,	50
" best collection of ornamental birds,	10 00

Pouters.

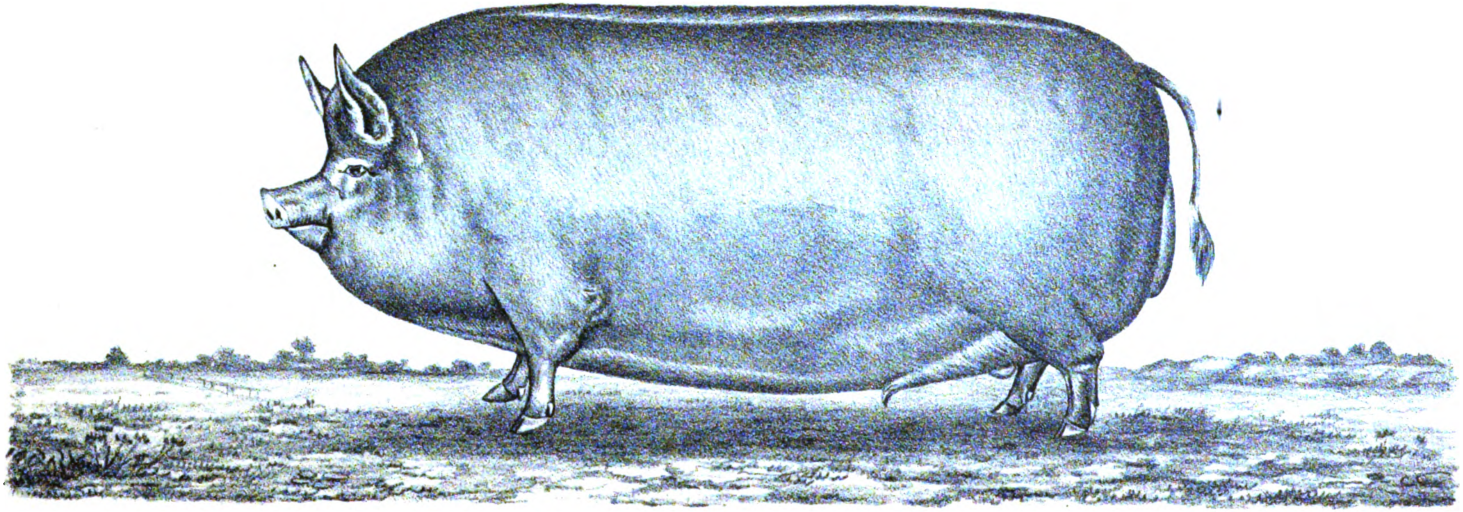
F. F. Kamp, Philadelphia, first, Blue,	2 00
" " first, Yellow,	2 00
" " first, Red,	2 00
" " first, White,	2 00
" " second, Yellow,	1 00
Thos. R. Cairns, New Haven, Connecticut, second, Blue,	1 00
" " " second, Red,	1 00
W. A. Wert, Philadelphia, second, White,	1 00
F. F. Kamp, Philadelphia, Blue,	H. C.
" " " Red,	H. C.

Carriers.

John Parker, Philadelphia, first, Black,	2 00
" " first, Dun,	2 00
Thomas Scholes, first, Blue,	2 00
G. W. Nosdel, York, Pennsylvania, first, Yellow,	2 00
J. A. Stovell, Philadelphia, second, Dun,	1 00
Thomas Scholes, Philadelphia, second, Black,	1 00
John Parker, Philadelphia, second, Blue,	1 00
" " Black,	H. C.
G. W. Nosdel, York, Pennsylvania, Blue,	H. C.
" " " " Red,	H. C.

Turbits.

John Spealer, Philadelphia, first, Black-tail,	2 00
" " first, Yellow-winged,	2 00
" " first, White-solid,	2 00
" " second, Blue-solid,	1 00
" " second, Blue-tail,	1 00
" " second, Black-solid,	1 00
" " Yellow,	H. C.



"EZRA," CHESHIRE BOAR.

Owned by Gilbert S. Button, Chittenango, N. Y. Winner First Prize
Pennsylvania State Fair, Philadelphia, 1885.

Mark Schoefield, Philadelphia, first Blue,	$2 00
" " first Blue-tailed,	2 00
" " first Dun-tailed,	2 00
John Parker, Philadelphia, first Silver,	2 00
" " first Yellow,	2 00
Charles Lippold, Lancaster, Pennsylvania, first Silver Winged,	2 00
J. A Stovell, Philadelphia, first Red,	2 00
" " first Black,	2 00
" " first Yellow-tailed,	2 00
John Parker, Philadelphia, second Yellow Winged,	1 00
" " second Black-tail,	1 00
" " second Yellow,	1 00
" " second Red.	1 00
Jesse G. Darlington, Pennsylvania, second White,	1 00
J. M. Hagan, Strasburg, Lancaster county, Pennsylvania, Solid Black,	H. C.
Joseph S. Milligan, Philadelphia, White,	H. C.
John Parker, Philadelphia, Solid Blue,	H. C.
Mark Schoefield, Lancaster, Pennsylvania, Red,	H. C.

Tumblers.

Thomas R. Cairns, New Haven, Connecticut, first, Red Short-faced,	2 00
" " " first, Red Kite,	2 00
John Spealer, Philadelphia, first, Blue-bearded,	2 00
" " first, Red-bald,	2 00
" " first, Yellow-mottled,	2 00
John Parker, first, Black-bald,	2 00
" first, Blue,	2 00
" first, Silver,	2 00
" first, Yellow,	2 00
John G. Schum, Lancaster, Pennsylvania, first, Blue-bald,	2 00
John A. Stovell, Philadelphia, first, Black,	2 00
" " first, Red,	2 00
" " first, Black-mottled,	2 00
John Parker, Philadelphia, second Blue Bearded,	1 00
Charles Lippold, Lancaster, Pennsylvania, second Parlor,	1 00
Joseph S. Milligan, Philadelphia, second Kites,	1 00
" " second Blue Bald,	1 00
Thomas Sholes, Philadelphia, second Black Bald,	1 00
John Spealer, Philadelphia, Black Bearded,	H. C.
" " " Black Bald,	H. C.
John Parker, Philadelphia, Black Bald,	H. C.
" " " Red,	H. C.
Jesse R. Darlington, Philadelphia, Yellow Bald,	H. C.
Joseph S. Milligan, Philadelphia, Kites,	H. C.
Thomas Scholes, Philadelphia, Blue Bald,	H. C.
W. Ehringer, Philadelphia, Yellow Band Silver,	H. C.
John A. Stovell, Red Throat,	H. C.

Fantails.

John Parker, Philadelphia, first Black.	2 00
" " first Blue,	2 00
M. Hagans, Strasburg, Lancaster county, Pennsylvania, first White Crested,	2 00

Oscar Seifert, Newark, New Jersey, first Red Saddleback,	$2 00
“ “ “ rst Black Saddleback,	2 00
“ “ “ rst Black-tail,	2 00
T. B. Greene, Woodbury, New Jersey, first White Crested Booted,	2 00
John Parker, Philadelphia, second Red,	1 00
T. B. Greene, Woodbury, New Jersey, second White Crested Booted,	1 00
John Parker, Philadelphia, second White,	1 00
T. B. Greene, Woodbury, New Jersey, White Crested Booted,	H. C.

Dragons.

John Spealer, Philadelphia, first Blue,	2 00
“ “ first White,	2 00
John E. Schum, Lancaster, Pennsylvania, Blue,	H. C.

Magpies.

John E. Schum, Lancaster, Pennsylvania, first Blue,	2 00
W. E. Springer, Philadelphia, first Black-Crested,	2 00
“ “ first Red,	2 00
T. B. Greene, Woodbury, New Jersey, first Black,	2 00
J. A. Stovell, Philadelphia, first Yellow Capped,	2 00
“ “ second Red Capped,	1 00
“ “ second Black Capped,	1 00
J. E. Schum, Lancaster, Pennsylvania, second Black,	1 00
W. E. Springer, Philadelphia, second Yellow,	1 00
J. M. Hagan, Lancaster, Pennsylvania, Red,	H. C.
“ “ “ Black,	H. C.
J. A. Stovell, Philadelphia, Yellow Capped,	H. C.

Jacobins.

John Parker, Philadelphia, first Red,	2 00
“ “ first Yellow,	2 00
Jesse G. Darlington, Philadelphia, first Black,	2 00
“ “ first White,	2 00
“ “ first Dun,	2 00
“ “ second Red,	1 00
“ “ second Black,	1 00
John Spealer, Philadelphia, second White,	1 00
John Parker, Philadelphia, Red,	H. C.
“ “ Yellow,	H. C.
“ “ White,	H. C.

Moorcaps.

John A. Stovell, Philadelphia, first Blue,	2 00
John E. Schum, Lancaster, Pennsylvania, first Black,	2 00
J. M. Hagan, Strasburg, Lancaster county, Pennsylvania, second Black,	1 00
B. F. Lewis, Gwynedd, Pa., second Blue,	1 00
John Parker, Philadelphia, Black.,	H. C.

Starlings.

J. M. Hagan, Strasburg, Lancaster county, Pennsylvania, Black,	H. C.

Snells.

Oscar Seifert, Newark, New Jersey, Red-tailed,	H. C.

Trumpeters.

J. M. Hagan, Strasburg, Lancaster county, Pennsylvania, first Black Russian,	$2 00
Oscar Seifert, Newark, New Jersey, first Red-winged White Bar,	2 00
“ “ “ “ Yellow “ “	2 00
“ “ “ “ Blue “ “	2 00
“ “ “ second Yellow-winged “	1 00
John E. Schum, Lancaster, Pennsylvania, second White,	1 00

Quakers.

J. M. Hagan, Strasburg, Lancaster county, Pennsylvania, second Starling,	1 00
John E. Schum, Lancaster, Pennsylvania, Starling,	H. C.

Blondinets.

Thomas Scholes, Philadelphia, first Spangled,	2 00
“ “ “ first Blue,	2 00
“ “ “ second Spangled,	1 00
“ “ “ second Black Laced,	1 00

Archangels.

G. W. Nosdel, York, Pennsylvania, first Yellow,	2 00
John Parker, Philadelphia, first Red,	2 00
“ “ “ second Red,	1 00
G. W. Nosdel, York, Pennsylvania, Red,	H. C.

Antwerps.

Herman Dienett, Philadelphia, first White,	2 00
W. A. Wert, Philadelphia, first Red Checker,	2 00
J. F. Rainer, Philadelphia, first Red Checker,	2 00
J. A. Stovell, Philadelphia, first Blue Checker,	2 00
“ “ first Silver Checker,	2 00
“ “ second White,	1 00
“ “ second Blue Checker,	1 00
B. F. Lewis, second Blue,	1 00
W. A. Wert, Philadelphia, second Red Checker,	1 00
John Spealer, Philadelphia, second Bar Silver,	1 00
“ “ Blue Checker,	H. C.
Herman Dienett, Philadelphia, Silver,	H. C.
John Parker, Philadelphia, Red Checker,	H. C.
“ “ Blue,	H. C.

Priests.

John E. Schum, Lancaster, Pennsylvania, first Blue,	2 00
“ “ first Yellow,	2 00
Oscar Seifert, Newark, New Jersey, first Red,	2 00
“ “ “ second Black White Bar,	1 00
“ “ “ second Yellow White Bar,	1 00

Owls.

John Spealer, Philadelphia, first Black Tailed,	2 00

Thomas Scholes, Philadelphia, first White English,	$2 00
“ “ first Silver English,	2 00
“ “ first Blue English,	2 00
“ “ first Yellow English,	2 00
“ “ first White China,	2 00
“ “ first Blue China,	2 00
“ “ first Silver China,	2 00
“ “ first Blue African,	2 00
“ “ first Silver African,	2 00
“ “ second White African,	1 00
“ “ second Blue African,	1 00
John Parker, Philadelphia, second Red English,	1 00
“ “ second White English,	1 00
“ “ second Black English,	1 00
“ “ second Dun English,	1 00
J. & George Boesh, Philadelphia, second Silver China,	1 00
“ “ second Blue China,	1 00
John Parker, Philadelphia, Dun English,	H. C.
“ “ Red English,	H. C.
“ “ Silver China,	H. C.
Thomas Scholes, Philadelphia, Blue African,	H. C.
“ “ “ Dun African,	H. C.
James A. Stovell, Philadelphia, Silver African,	H. C.
“ “ “ White African,	H. C.
J. H. S. Milligan, Philadelphia, Blue China,	H. C.

Swallows.

John Yerkes, Philadelphia, first Black,	2 00
“ “ first Blue,	2 00
John Spealer, Philadelphia, first Red,	2 00
Oscar Seifert, Newark, New Jersey, first Blue White Bar,	2 00
“ “ “ first Red White Bar,	2 00
“ “ “ first Black White Bar,	2 00
G. W. Nosdel, first Yellow,	2 00
“ second Blue,	1 00
John Yerkes, Philadelphia, second Red,	1 00
“ “ second Yellow,	1 00
John E. Schum, Lancaster, Pennsylvania, second Black,	1 00
“ “ “ Red,	H. C.
G. W. Nosdel, Black,	H. C.
Oscar Seifert, Newark, New Jersey, Black White Bar,	H. C.

Ring Doves.

John Spealer, Philadelphia, first one pair,	2 00
B. F. Lewis, second one pair,	1 00
H. W. Vahle, one pair,	H. C.

Helmets.

Oscar Seifert, Newark, New Jersey, second Yellow,	1 00

Mahomets.

John Parker, Philadelphia, first Red,	2 00

Barbs.

J. A. Stovell, Philadelphia, first, White,	$2 00
John Parker, Philadelphia, first, Black,	2 00
Thomas Schoels, Philadelphia, first, Dun,	2 00
“ “ first, Red,	2 00
“ “ second, Black,	1 00
John Parker, Philadelphia, second, Red,	1 00
“ “ second, White,	1 00
“ “ White,	H. C.
John E. Schum, Lancaster, Pennsylvania, Black,	H. C.

Rollers.

G. W. Nosdel, first, Yellow-breasted,	2 00
“ first, Red,	2 00
John E. Schum, Lancaster, Pennsylvania, second, Birmingham,	1 00
“ “ “ Birmingham,	H. C.

Turbiteens.

John Parker, first, one pair,	2 00

Satinetts.

Thomas Schoels, first, Spangled,	2 00
“ second, Spangled,	1 00

Bluetts.

Thomas Schoels, first, one pair,	2 00

Grizzles.

J. A. Stovell, first, Red-ash,	3 00
“ second, Black-mottled,	2 00

Best collection of pigeons.

John Parker, first,	25 00
Thomas Scholes, second,	15 00
J. A. Stovell, third,	10 00
Oscar Seifert, fourth,	5 00

Chinese Pheasants.

Jesse M. Rook, second, one pair,	3 00
Jesse M. Rook, first, one pair,	5 00

English Pheasants.

Belmont Perry, first golden, one pair,	5 00
Belmont Perry, second silver, one pair,	3 00
Jesse M. Rook, first, one pair,	5 00
Jesse M. Rook, second, one pair,	3 00

CLASS 32.—Furbearing Pets.

Belgian Rabbits.

John Parker, first,	2 00
John Parker, second,	1 00
John Parker, H. C.	

Madagascar Rabbits.

Charles Lippold, first,	$2 00

English Rabbits.

B. F. Lewis, first, common,	2 00
B. F. Lewis, second, common,	1 00

Guinea Pigs.

B. F. Lewis, first, smooth,	1 00
John Parker, first, rough,	1 00
John Parker, second, rough,	50
W. A. Wirtz, first, rough,	1 00
" second, rough,	50
" first, rough,	1 00
" second, rough,	50
" first, smooth,	1 00
" second, smooth,	50

GROUP VI.—Industrial Insects.

Bees.

Arthur Todd, first, colony of Italian bees in hive, with movable frame,	10 00
Thomas C. Davidson, second, colony of Italian bees in hive, with movable frame,	Silver medal.
Arthur Todd, first, colony of Syrian bees, &c.,	Silver medal.
S. W. Morrison, M. D., first, colony of Carniolan bees, &c.,	Silver medal.
Arthur Todd, first, colony of Black bees, &c.,	Bronze medal.
Lemuel Stout, first, queen cells as actually built by bees,	Silver medal.
Lemuel Stout, first, queens, with retinue of bees,	Silver medal.

I compliment Mr. Todd as well on all his yard, as we drove out and examined all his stock.

C. A. READING.

PHILADELPHIA, *September 27, 1885.*

Honey and wax.

J. F. Turner, first, comb honey, ten pounds,	Bronze medal.
Arthur Todd, first, extracted honey,	Bronze medal.
Model Bee-Hive Co., second, extracted honey, ten pounds,	Diploma.
Arthur Todd, first, beeswax,	Bronze medal.
Arthur Todd, best and largest collection of honey,	Silver medal.

CLASS 35.—HIVES AND APPLIANCES.

Arthur Todd, hives with movable frames, first premium,	Bronze medal.
Arthur Todd, straw hive, first premium,	Diploma.
Arthur Todd, apiarian tools, first premium,	Bronze medals.
Arthur Todd, honey extractor, first premium,	Diploma.
Thomas C. Davidson, ornamental practical movable frame, first premium,	Bronze medal.
John Ryewell, reversible frame, first premium,	Diploma.

Arthur Todd, samples of comb foundation, first premium, .	Diploma.
Arthur Todd, comb honey rack, first premium, . . .	Diploma.
Arthur Todd, magic lantern slide, first premium, ...	Bronze medal.

The committee make the above report, in general agreeing with Dr. Reading, but differing in a few cases, as noted above.

J. Hastobuck,
S. W. Morrison.

GROUP VIII.—Dogs.

The Bench Show of Dogs was in charge of the Philadelphia Kennel Club.

DEPARTMENT 2.—Farm and Garden Products and their Proximate Manufactures.

GROUP IX.--Meats and Dairy Products.

Sub-Csass 39b.—Butter.

John C. Comfort, dairy butter, one hundred pounds, first premium,	$25 00
D. H. Branson, dairy butter, print, ten pounds, first premium.	20 00
J. S. Keller, dairy butter, print, ten pounds, second premium,	10 00
A. S. Cadwallader & Co., dairy butter, print, ten pounds, third premium, ...	5 00

GROUP X.--Skins and Fibre

CLASS 40.—Skins and Animal Fibre.

R. H. Russel, fleece merino, ...	Silver medal.
" " " rams, ...	Silver medal.
J. G. Paxton & Sons, fleece merino, rams, . .	Worthy of favorable mention.
" " " ewes,	Silver medal.
R. H. Russel, fleece merino, ewes, .	Worthy of favorable mention.

GROUP XI.--Grain and Seeds.

CLASS 42.—Shown by Societies or Organized Clubs.

Octoraro Farmers' Club, collection grain, seeds, and vegetables, second premium, ...	$25 00
State Horticultural Association, collection of fruits, first premium,	50 00
Octoraro Farmers' Club, wheat, best and largest society collection, first premium, . .	25 00
" " rye, best and largest society collection, first premium, .	25 00
" " oats, best and largest society collection, first premium, ...	25 00
" " corn, best and largest society collection, first premium,	15 00
" " best six bushels of wheat, white, first premium, . . .	20 00
" " best six bushels of wheat, red, first premium, ...	20 00
" " wheat, three specimens, one half bushel each, different varieties, first premium,	20 00

Octoraro Farmers' Club, best six bushels of rye, first premium,	$10 00
“ “ best yellow corn on ears, six bushels, first premium,	10 00
“ “ best six bushels white flint corn on ears, first premium,	10 00
“ “ best six bushels oats, first premium,	10 00
“ “ best six pecks timothy seed, first premium,	5 00
“ “ best six pecks clover seed, first premium,	5 00

CLASS 44.—SHOWN BY INDIVIDUALS OR FIRMS.

D. Landreth & Sons, best exhibit of seeds and vegetables, first premium,	20 00
D. Landreth & Sons, wheat which has produced the same for two years, &c., first premium,	Silver medal.
D. Landreth & Sons, white wheat, bushel, first premium,	$5 00
D. H. Branson, white wheat, bushel, second premium,	3 00
Samuel Noble, amber wheat, bushel, first premium,	5 00
D. H. Branson, amber wheat, bushel, second premium,	3 00
George A. Deitz, red wheat, bushel, first premium,	5 00
Samuel Wilson, red wheat, bushel, second premium,	3 00
George A. Deitz, wheat, acclimated for two years, first premium,	5 00
Samuel Wilson, wheat acclimated for two years, second premium,	3 00
George A. Deitz, bearded wheat, sheaf, first premium,	2 00
Samuel Wilson, bearded wheat, sheaf, second premium,	1 00
D. H. Branson, bald wheat, sheaf, first premium,	2 00
D. Landreth & Sons, bald wheat, sheaf, second premium,	1 00
Samuel Wilson, wheat, displayed in varied form, first premium,	10 00
D. H. Branson, wheat, displayed in varied form, second premium,	5 00
Johnson & Stokes, rye, bushel, first premium,	5 00
“ “ “ second premium,	3 00
Samuel Wilson, yellow corn, bushel, shelled, first premium,	3 00
William Smith, yellow corn, bushel, shelled, second premium,	2 00
D. Landreth & Sons, white flint corn, bushel, shelled, first premium,	3 00
Samuel Wilson, white flint corn, bushel, shelled, second premium,	2 00
D. Landreth & Sons, Indian corn, yellow gourd seed, ears, first premium,	2 00
D. H. Branson, Indian corn, yellow gourd seed, ears, second premium,	1 00
D. Landreth & Sons, Indian corn, white gourd seeds, ears, first premium,	2 00
D. H. Branson, Indian corn, white gourd seed, ears, second premium,	1 00
D. Landreth & Sons, Indian corn, yellow flint, ears, first premium,	2 00
“ “ “ white flint, ears, first premium,	2 00
D. H. Branson, Indian corn, white flint, ears, second premium,	1 00
D. Landreth & Sons, Indian pop-corn, ears, first premium,	2 00
“ “ “ “ second premium,	1 00
“ “ Indian sugar-corn, ears, first premium,	5 00
“ “ Indian corn, collection, first premium,	5 00
D. H. Branson, Indian corn, collection, second premium,	3 00

JAMES MILES,
W. G. PARKE.

Johnston & Stokes, white oats, bushel, first premium,	$3 00
D. Landreth & Sons, white oats, bushel, second premium,	2 00

John C. Comfort, black oats, bushel, first premium,	$3 00
D. Landreth & Sons, black oats, bushel, second premium,	2 00
D. H. Branson, oats, either variety, sheaf, first premium,	2 00
Samuel Wilson, barley, bushel, first premium,	3 00
D. Landreth & Sons, barley, bushel, second premium,	2 00
" " buckwheat, bushel, first premium,	3 00
W. H. Smith, buckwheat, bushel, second premium,	2 00
D. Landreth & Sons, seed grain, collection, first premium,	10 00
Johnson & Stokes, seed grain, collection, second premium,	5 00
D. Landreth & Sons, field bean seed, one half bushel, first premium,	2 00
Johnson & Stokes, field bean seed, one half bushel, second premium,	1 00
Samuel Wilson, sorghum, six or more stalks, first premium,	2 00
C. B. Rogers, sorghum seed, first premium,	2 00
D. Landreth & Sons, flaxseed, first premium,	2 00
Johnson & Stokes, flaxseed, second premium,	1 00
" sago pea, peck, first premium,	2 00
D. Landreth & Sons, rice, upland, exhibited in the sheaf, second premium,	2 00
D. Landreth & Sons, flax, sheaf, second premium,	2 00
" " millet, display, sheaf, five varieties, first premium,	3 00
Samuel Wilson, millet, display, sheaf, five varieties, second premium,	2 00
" sunflower, weightiest, one half dozen heads, first premium,	2 00
D. Landreth & Sons, sunflower, weightiest, one half dozen heads, second premium,	1 00
Johnson & Stokes, lupin seed, bushel, first premium,	5 00
D. Landreth & Sons, collection small seeds, two pounds each, first premium,	5 00
William H. Smith, collection small seeds, two pounds each, second premium,	3 00
C. B. Rogers, timothy seed, bushel, first premium,	3 00
" clover seed, one half bushel, first premium,	3 00
D. Landreth & Sons, grass seed, collection, first premium,	5 00
Johnson & Stokes, grass seed, collection, first premium,	3 00

W. G. Parke,
James Miles.

GROUP XII.--Vegetables and Grasses.

CLASS 45.—Tubers, Bulbs and Roots.

Sub-Class 45c.—Shown by Individuals and Firms.

J. M. & R. C. Kaighn, potatoes, collection fifty or more varieties, first premium,	$15 00
" " potatoes, collection five or more varieties, first premium,	5 00
Samuel Wilson, potatoes, collection five or more varieties, second premium,	3 00
D. Landreth & Sons, potatoes, wild, collection three or more varieties, first premium,	5 00

D. Landreth & Sons, potatoes, collection Seedling American, first premium,	$5 00
Latham & Bros., sweet potatoes, one half bushel, red, first premium,	2 00
J. M. & R. C. Kaighn, sweet potatoes, one half bushel, red, second premium,	1 00
Latham & Bros., sweet potatoes, one half bushel, yellow, first premium,	2 00
J. M. & R. C. Kaighn, sweet potatoes, one half bushel, yellow, second premium,	1 00
" " yams, one half bushel, first premium,	2 00
D. Landreth & Sons, onions, white flat, six, first premium,	2 00
George D. Field, onions, white flat, six, second premium,	1 00
" onions, white round, six, first premium,	2 00
Samuel Wilson, onions, white round, six, second premium,	1 00
George D. Field, onions, red flat, six, first premium,	2 00
Samuel Wilson, onions, red flat, six, second premium,	1 00
" onions, red round, six, first premium,	2 00
George D. Field, onions, red round, second premium,	1 00
Samuel Wilson, onions, yellow flat, six, first premium,	2 00
George D. Field, onions, yellow flat, six, second premium,	1 00
" onions, yellow round, six, first premium,	2 00
Samuel Wilson, onions, yellow round, six, second premium,	1 00
" onions, collection of foreign, first premium,	2 00
George D. Field, onions, collection of foreign, second premium,	1 00
" onions, general collection, first premium,	5 00
Samuel Wilson, onions, general collection, second premium,	3 00
Martin Geary, leeks, twelve specimens, first premium,	2 00
Henry A. Dreer, radishes, six specimens, three varieties, turnip form, first premium,	2 00
G. D. Field, radishes, six specimens, three varieties, turnip form, second premium,	1 00
Henry A. Dreer, radishes, half long form, first premium,	2 00
George D. Field, radishes, half long form, second premium,	1 00
Samuel Wilson, radishes, long form, first premium,	2 00
G. D. Field, radishes, long form, second premium,	1 00
Henry A. Dreer, radishes, winter, first premium,	2 00
G. D. Field, radishes, winter, second premium,	1 00
D. Landreth & Sons, display of cattle-feeding roots, first premium,	10 00
" " carrots, table use, twelve specimens, first premium,	2 00
Henry A. Dreer, carrots, table use, twelve specimens, second premium,	1 00
D. Landreth & Sons, carrots, cattle-feeding, first premium,	2 00
G. D. Field, carrots, collection, second premium,	1 00
D. Landreth & Sons, beets, table use, first premium,	3 00
G. D. Field, beets, table use, second premium,	2 00
G. W. Childs, mangolds, long red, first premium,	2 00
Martin Geary, mangolds, long red, second premium,	1 00
G. W. Childs, mangolds, red globe, first premium,	2 00
Martin Geary, mangolds, red globe, second premium,	1 00
G. W. Childs, mangolds, yellow globe, first premium,	2 00
Martin Geary, mangolds, yellow globe, second premium,	1 00
G. W. Childs, mangolds, golden tankard, first premium,	2 00
Martin Geary, mangolds, golden tankard, second premium,	1 00

G. W. Childs, mangolds, symmetrical collection, first premium,	$3 00
Martin Geary, mangolds, symmetrical collection, second premium,	2 00

JAMES MILES,
WILLIAM S. RUTHERFORD,
J. S. KELLY.

George D. Field, turnips, table use, twenty specimens, second premium,	$1 00
Martin Geary, turnips, table use, twelve specimens, white, first premium,	2 00
G. D. Field, turnips, table use, twelve specimens, white, second premium,	1 00
J. M. & R. C. Kaighn, parsnips, long variety, first premium,	2 00
G. D. Field, parsnips, long variety, second premium,	1 00
" parsnips, round, second premium,	1 00
Martin Geary, salsify, first premium,	2 00
J. M. & R. C. Kaighn, salsify, second premium,	1 00
Johnson & Stokes, pumpkins, most promising foreign specimen, first premium,	3 00
Samuel Wilson, pumpkins, most promising foreign specimen, second premium,	2 00
Samuel Wilson, pumpkins, nine specimens, three varieties, first premium,	2 00
G. D. Field, pumpkins, nine specimens, three varieties, second premium,	1 00
Samuel Wilson, pumpkins, best collection foreign varieties, first premium,	3 00
Samuel Wilson, pumpkins, heaviest specimen, first premium,	5 00
John Krewson, pumpkins, heaviest specimen, second premium,	3 00
Samuel Wilson, cucumbers, field sorts, first premium,	2 00
Samuel Wilson, cucumbers, display foreign varieties, first premium,	5 00
D. Landreth & Son, gourds, collection, first premium,	2 00
Samuel Wilson, gourds, collection, second premium,	1 00
Samuel Wilson, beans, collection of American bush, first premium,	2 00
J. M. & R. C. Kaighn, beans, collection of American bush, second premium,	1 00
G. D. Field, beans, collection of American pole, first premium,	2 00
H. A. Dreer, beans, collection of American pole, second premium,	1 00
Samuel Wilson, collection of foreign, first premium,	2 00
G. D. Field, beans, collection of foreign, second premium,	1 00
J. M. & R. C. Kaighn, cabbage, six heads, Flat Head, first premium,	2 00
G. D. Field, cabbage, six heads, Flat Head, second premium,	1 00
G. D. Field, cabbage, six specimens, Savoys, first premium,	2 00
G. D. Field, cabbage, general collection, first premium,	3 00
G. D. Field, cauliflower, six heads, first premium,	3 00
G. D. Field, celery, six stalks dwarf white, first premium,	2 00
Martin Geary, celery, six stalks dwarf white, second premium,	1 00
D. H. Branson, celery, six stalks tall white, first premium,	2 00
Martin Geary, celery, six stalks tall white, second premium,	1 00
Martin Geary, celery, six stalks red, first premium,	2 00
H. A. Dreer, egg plant, four specimens long round purple, first premium,	3 00
G. W. Childs, egg plant, four specimens long round purple, second premium,	2 00

D. Landreth & Son, kohl rabi, twelve specimens, first premium, .	$2 00
H. A. Dreer, kohl rabi, twelve specimens, second premium,	1 00
G. D. Field, lettuce, six heads white cabbage, first premium, . .	2 00
G. D. Field, lettuce, six heads Cass variety, ...	2 00

To the President:

Your committee on articles enumerate from 994 to 1021, under the head of garden seeds vegetables, would respectfully report that they have attended to the duties assigned them, and, after a careful consideration of each competition, have made the awards they deemed fair to all concerned, and marked the amount opposite the exhibitor.

Respectfully,

W. S. RUTHERFORD,
JAS. A. RUTHERFORD.

D. Landreth & Son, okra, dish of pods, first premium, ...	$2 00
Martin Geary, okra, dish of pods, second premium, ...	1 00
Samuel Wilson, peppers, twenty specimens, first premium,	2 00
D. Landreth & Son, peppers, twenty specimens, second premium,	1 00
H. A. Dreer, peppers, six specimens Bell or Blue Nose, first premium,	2 00
Samuel Wilson, peppers, six specimens Bell or Blue Nose, second premium, ...	1 00
D. Landreth and Son, peppers, six specimens Bell or Blue Nose, (new varieties,) first premium, ...	2 00
J. M. & R. C. Kaighn, peas, show dish, ...	2 00
G. D. Field, peas, show dish, ...	1 00
G. D. Field, rhubarb, six stalks, ...	2 00
Martin Geary, rhubarb, six stalks, ...	1 00
G. D. Field, spinach, finest leaves, ...	2 00
D. Landreth & Son, tomatoes, nine specimens, one variety, . . .	2 00
Samuel Wilson, tomatoes, nine specimens, one variety, ...	1 00
D. Landreth & Son, collection of thirty, nine varieties,	5 00

JAMES MILES,
W. S. RUTHERFORD,
J. S. KELLER.

SPECIAL PREMIUMS.

Offered by Peter Henderson & Co., New York.

George D. Field, white plume celery, four roots, first premium, .	$10 00

Offered by D. Landreth & Son, Philadelphia.

Martin Geary, early cabbage, first premium, ...	5 00
" early summer flat-head cabbage, first premium, . .	5 00
" sugar corn, twelve varieties, first premium, ...	3 00
" parsnips, (Bloomsdale,) twelve varieties, first premium, ...	3 00

Class 46a.—Pickles and Canned Vegetables.

J. M. & R. C. Kaighn, collection corn in air-tight jars, second premium, ...	1 00

JAMES MILES,
WILLIAM S. RUTHERFORD,
J. S. KELLY.

CLASS 46.—Grasses and Green Vegetables

G. D. Field, collection of green vegetables, first premium,	$30 00
J. M. & R. C. Kaighn, collection of green vegetables, second premium,	15 00
Samuel Wilson, display of dried forage, first premium,	3 00
J. M. & R. C. Kaighn, display of dried forage, second premium,	2 00
D. Landreth & Sons, grass growing in pots, first premium,	5 00
" " display of grasses for planting in sandy places, &c., first premium,	3 00
" " display of cucurbitaceous vegetables, first premium,	15 00
G. D. Field, display of cucurbitaceous vegetables, second premium,	10 00
D. Landreth & Sons, collection of watermelons, first premium,	15 00
Johnson & Stokes, collection of watermelons, second premium,	10 00
J. F. Jones, watermelon.most perfect specimen, &c., first premium,	3 00
Johnson & Stokes, watermelon, most perfect specimen, &c., second premium,	2 00
J. F. Jones, watermelon, oblong, dark-skinned, first premium.	2 00
Johnson & Stokes, watermelon, oblong, dark-skinned, second premium,	1 00
J. F. Jones, watermelon, ovate, dark-skinned, first premium,	2 00
Johnson & Stokes, watermelon, ovate, dark-skinned, second premium,	1 00
G. D. Field, watermelon, oblong, light-skinned, first premium,	2 00
Johnson & Stokes, watermelon, heaviest specimen, first premium,	3 00
J. F. Jones, watermelon, heaviest specimen, second premium,	2 00
D. Landreth & Sons, watermelon, foreign specimen, first premium,	3 00

Owing to the late day of examination, and the consequent decayed condition of the exhibits in Numbers 978 to 985, inclusive, your committee was unable to make any award.

D. Landreth & Sons, squashes, summer, collection, first premium,	$2 00
J. M. & R. C. Kaighn, squashes, summer, collection, second premium,	1 00
D. Landreth & Sons, squashes, twelve specimens, three varieties, first premium,	2 00
Samuel Wilson, squashes, twelve specimens, three varieties, second premium,	1 00
D. Landreth & Sons, summer squashes, foreign variety, first premium,	2 00
Samuel Wilson, summer squashes, foreign variety, second premium,	1 00
D. Landreth & Sons, squashes, winter, collection, first premium,	2 00
Samuel Wilson, squashes, winter, collection, second premium,	1 00
D. Landreth & Sons, squashes, twelve specimens, three varieties, first premium,	2 00
Samuel Wilson, squashes, twelve specimens, three varieties, second premium,	1 00
D. Landreth & Sons, squashes, winter, foreign variety, first premium,	2 00
Samuel Wilson, squashes, winter, foreign variety, second premium,	1 00
D. Landreth & Son, squashes, most promising foreign specimens, first premium,	2 00

Samuel Wilson, squashes, most promising foreign varieties, second premium,	$1 00
D. Landreth & Sons, squashes, collection, foreign, first premium,	3 00
Samuel Wilson, squashes, collection, foreign, second premium,	2 00

Mr. President: Your committee has made a very careful examination of the exhibits in class 46, and make the awards herein mentioned.

Yours, &c.,
JAMES MILES,
THOMAS G. JANVIER.

GROUP XIII—Fruits and Nuts.

CLASS 47.—GRAPES, STONE FRUITS AND POMACEOUS FRUITS.

Sub-Class 47c.—Shown by Individuals or Firms.

E. Satterthwaite, general assortment of fruits,	$15 00
Daniel Smeych, grapes, foreign, six bunches, six varieties,	5 00
David Ferguson & Son, grapes, foreign, six bunches, six varieties,	3 00
Patrick Coonahan, grapes, Black Hamburg,	3 00
Daniel Smeych, grapes, Black Hamburg,	2 00
Patrick Coonahan, Muscat, three bunches,	3 00
Daniel Smeych, Muscat, three bunches,	2 00
J. Cheston Morris, Chasselass de Fontanfleun,	3 00
J. Cheston Morris, Gross Columbian,	2 00
D. Ferguson & Son, display of foreign grapes,	10 00
Joel Horner & Son, New Jersey, collection of native grapes,	10 00
P. Kelleher, collection of native grapes, ten varieties,	5 00
Joel Horner & Son, collection of native grapes, ten varieties,	3 00
Joel Horner & Son, Concord, six bunches,	2 00
Patrick Coonahan, Concord, six bunches,	1 00
H. M. Engle & Son, Martha, six bunches,	2 00
Joel Horner & Son, Martha, six bunches,	1 00
Joel Horner & Son, Clinton, six bunches,	2 00
George W. Jessup, Magara, six bunches,	2 00
Milton Barnard, Magara, six bunches,	1 00
Joel Horner & Son, Brighton, six bunches,	2 00
J. A. Herr, Cedar Spring, six bunches,	1 00
J. A. Herr, Catawba, six bunches,	2 00
H. M. Engle & Son, Catawba, six bunches,	1 00
Joel Horner & Son, Delaware,	2 00
Newberry Fritz, Delaware,	1 00
H. M. Engle & Son, Rodgers' Hybrids,	2 00
Joel Horner & Son, Rodgers' Hybrids,	1 00
Joel Horner & Son, other variety,	2 00
Joel Horner & Son, new variety,	1 00
Joel Horner & Son, collection native grapes,	10 00

Having made a careful examination of the fruit submitted for our examination, named in this class, we have made the foregoing awards.

W. H. HOLSTEIN,
D. H. NEIMAN,
GABRIEL HIESTER.

Stone Fruits.

E. Satterthwaite, Crawford peaches,	$2 00
E. Satterthwaite, Ward's late peaches,	2 00
E. Satterthwaite, Smock,	2 00

E. Satterthwaite, Sloways,	$2 00
E. Satterthwaite, Stump the World,	2 00
E. Satterthwaite, Old Mixon Free,	2 00
Christopher Shearer, new variety,	2 00
J. M. & R. C. Kaighn, basket,	5 00
E. Satterthwaite, basket,	2 00
E. Satterthwaite, general collection,	20 00

Pomaceous Fruits.

J. S. Keller, plums,	2 00
E. Satterthwaite, pears, largest collection,	20 00
E. Satterthwaite, fifty varieties,	25 00
J. M. & R. C. Kaighn, twenty varieties,	10 00
Daniel Smeych, twenty varieties,	5 00
J. M. & R. C. Kaighn, collection ten varieties,	5 00
Christian Rudolph, French Bartletts,	2 00
J. M. & R. C. Kaighn, French Bartletts, twelve specimens,	2 00
Daniel Smeych, French Bartletts, twelve specimens,	1 00
Alberger & Bro., Seckel,	2 00
J. W. Lauderbach, Seckel,	1 00
E. Satterthwaite, Buerré d'Anjou,	2 00
Daniel Smeych, Buerré d'Anjou,	1 00
E. Satterthwaite, Lawrence,	2 00
J. M. & R. C. Kaighn, Lawrence,	1 00
E. Satterthwaite, Sheldon,	2 00
Daniel Smeych, Sheldon,	1 00
E. Satterthwaite, Howell,	2 00
E. Satterthwaite, Duchess d'Angouléme,	2 00
J. M. & R. C. Kaighn, Duchess d'Angouléme,	1 00
J. A. Herr, Louise Bonne,	2 00
J. M. & R. C. Kaighn, Louise Bonne,	1 00
J. M. & R. C. Kaighn, Winter Nelis,	2 00
E. Satterthwaite, Winter Nelis,	1 00
Ellwanger & Barry, New York, Buerré Rose,	2 00
E. Satterthwaite, Buerré Rose,	1 00
E. Satterthwaite, other variety,	2 00
John Crane, other variety,	1 00
E. Satterthwaite, six fall varieties,	3 00
E. Satterthwaite, six winter varieties,	3 00
E. Satterthwaite, basket,	5 00
J. M. & R. C. Kaighn, basket,	2 00

We have carefully examined the foregoing entries and award as indicated

D. H. Neiman,
W. H. Holstein,
Gabriel Hiester.

Apples.

Daniel Smeych, collection of twenty-five varieties,	$20 00
Samuel Wilson, collection of ten varieties,	10 00
J. M. & R. C. Kaighn, collection of ten varieties,	5 00
Samuel Wilson, Baldwins,	2 00
J. M. & R. C. Kaighn, Baldwins,	1 00
Samuel Wilson, Smith's Cider,	2 00
J. M. & R. C. Kaighn, Smith's Cider,	1 00
Samuel Wilson, Rhode Island Greenings,	2 00

J. M. &. R. C. Kaighn, Rhode Island Greenings,	$1 00
J. M. & R. C. Kaighn, King of Tompkins County,	2 00
Samuel Wilson, King of Tompkins County,	1 00
J. M. & R. C. Kaighn, Northern Spy,	2 00
Newberry Fretz, Northern Spy,	1 00
J. M. & R. C. Kaighn, Smokehouse,	2 00
Samuel Wilson, Smokehouse,	1 00
Samuel Wilson, Maiden's Blush,	2 00
J. M. & R. C. Kaighn, Maiden's Blush,	1 00
H. H. & C. Pratt, Rambo,	1 00
Newberry Fretz, Pound,	2 00
J. M. & R. C. Kaighn, Porter,	1 00
Samuel Wilson, any other variety,	2 00
J. S. Keller, any other variety,	2 00
J. B. Smith, any other variety,	1 00
Samuel Wilson, six fall varieties,	5 00
Samuel Wilson, six winter varieties,	5 00
Samuel Wilson, basket of six varieties,	5 00
J. M. & R. C. Kaighn, basket of six varieties,	2 00

Quinces.

William Lightfoot, collection of three varieties,	5 00
E. Satterthwaite, collection of three varieties,	2 00
J. A. Herr, peck,	2 00
E. Satterthwaite, peck,	1 00
J. H. Cowperthwaite, basket,	3 00
E. Satterthwaite, basket,	2 00

Having made a careful examination of the fruit submitted for our inspection, we have made the foregoing awards.

W. H. HOLSTEIN,
D. H. NEIMAN,
GABRIEL HIESTER.

CLASS 48.—BERRIES AND NUTS.

J. M. & R. C. Kaighn, uncultivated walnuts,	$1 00
J. C. Comfort, English walnuts,	1 00
E. Satterthwaite, chestnuts,	1 00

SUB-CLASS 48a.—PRESERVES AND JELLIES.

Dr. E. H. Shourds, chemically prepared fruits,	Silver Medal

GROUP XIV---Farinaceous Products.

CLASS 49—GROUND, CRUSHED, AND MALTED GRAIN.

Geo. Hecker & Co., barrel winter wheat flour,	25 00
Burrows, Fry & Freher, barrel winter wheat flour,	Diploma.
Burrows, Fry & Freher, spring wheat flour,	Diploma.
E. R. Gross, rye flour,	Silver Medal.
Burrows, Fry & Freher, Graham flour,	Silver Medal.
E. R. Gross, yellow cornmeal,	Silver Medal.
Burrows, Fry & Freher, display flour,	Silver Medal.
E. R. Gross, white cornmeal,	Silver Medal.
Burrows, Fry & Freher, (classification,)	Silver Medal.
Hoover & Co., oatmeal,	Silver Medal.

E. R. Gross, buckwheat flour,	Silver Medal.
Geo. V. Hecker & Co., buckwheat flour, self-raising,	Silver Medal.
E. R. Gross, hulled barley,	Silver Medal.
E. R. Gross, crushed wheat,	Silver Medal.
E. R. Gross, crushed oats,	Bronze Medal.
Hoover & Co., oats,	Bronze Medal.
E. R. Gross, hominy grits,	Bronze Medal.
Geo. V. Hecker, farina,	Bronze Medal.

CLASS 50—BREAD AND PASTRY.

Millenard Cliff Cracker Co., collection pastry,	Bronze Medal.
Millenard Cliff Cracker Co., cakes and crackers,	Bronze Medal.
Miss Lucy J. Twaddell, home-made bread,	5 00
Miss Kate Geary, home-made bread,	3 00

Respectfully submitted.

W. H. HOLSTEIN,
J. LEEDON WORRELL,
GEO. WOLF.

GROUP XV—Sugars, and Narcotic, and Acid Products.

CLASS 53—HOPS AND FERMENTED LIQUORS.

G. C. Ryckman, Brocton, New York, collection of native wines,	$20 00
G. C. Ryckman, Clinton wines,	5 00
G. C. Ryckman, Concord wines,	5 00
J. S. Keller, Concord wines,	3 00
J. C. Ryckman, any other variety,	5 00
Philip P. Townsend, any other variety,	2 00
Philip P. Townsend, currant wine sample,	3 00
Susan M. Miller, Philadelphia, currant wine sample,	2 00
Philip P. Townsend, blackberry wine sample,	3 00
Susan M. Miller, blackberry wine sample,	2 00

The wines of Julius Hincke, of Egg Harbor, not being placed in competition, the committee regrets that they were unable to give any award, but from the reputation of the gentleman, and our knowledge, we would make special mention of the show and award him a diploma. The Franklin and other brands are well known.

Respectfully,

T. T. WORTH,
T. J. ZIMMERMAN,
R. JAMES.

GROUP XVI—Ornamental Plants and Flowers.

CLASS 54—GROWING ORNAMENTAL PLANTS AND OUTSIDE DECORATIONS.

David Ferguson & Son, ornamental foliage plants, twenty-five varieties, first premium,	$30 00
Hugh Graham & Company, ornamental foliage plants, twenty-five varieties, second premium,	20 00
Henry A. Dreer, ornamental foliage plants, twenty-five varieties, third premium,	10 00
Christian Eisele, ornamental foliage plants, twenty-five varieties, fourth premium,	5 00
David Ferguson & Son, foliage plants, six varieties, first premium,	5 00
Christian Eisele, foliage plants, six varieties, second premium,	3 00

Gardeners and Amateurs.

A. Warne, ornamental foliage plants, twenty-five varieties,	$30 00
A. Warne, ornamental foliage plants, six varieties,	5 00
A. Warne, specimen plant, first premium,	10 00
Hugh Graham & Co., specimen plant, second premium,	5 00
Hugh Graham & Co., ten palms, ten varieties, first premium,	20 00
Christian Eisele, ten palms, ten varieties, second premium,	10 00
Hugh Graham & Co., six Marantas, six varieties, first premium,	10 00
David Ferguson & Son, six Marantas, six varieties,	5 00
Christian Eisele, six Dracænas, six varieties, first premium,	5 00
David Ferguson & Son, six Dracænas, six varieties, second premium,	3 00
A. Warne, collection new and rare plants, first premium,	20 00
David Furguson & Son, new and rare plants, second premium,	10 00
Hugh Graham & Co., twelve ferns, twelve varieties, first premium,	15 00
A. Warne, twelve ferns, twelve varieties, second premium,	10 00
Christian Eisele, display Selaginellas, twelve varieties, first premium,	10 00
A. Warne, twenty-five ferns, twenty-five varieties, first premium,	10 00
Hugh Graham & Co., twenty-five ferns, twenty-five varieties, second premium,	5 00
A. Warne, twelve Caladiums, twelve varieties, first premium,	10 00
H. A. Dreer, twelve Caladiums, twelve varieties, second premium,	5 00
Christian Eisele, twelve Coleus, twelve varieties, first premium.	10 00
Alburger Bros., twelve Coleus, twelve varieties, second premium,	5 00
David Furguson & Son, twelve plants in bloom, twelve varieties,	5 00
Alburger Bro., twelve Geraniums, first premium,	5 00
Henry A. Dreer, Gloxinias, collection, first premium,	5 00
Henry A. Dreer, twelve flowering Begonias, first premium,	3 00
David Furguson & Son, twelve ornamental foliage Begonias,	5 00
Henry A. Dreer, six China Asters, in bloom, first premium,	3 00
David Furguson & Son, case new and rare exotics,	20 00
Alburger & Bro., hanging baskets, first premium,	3 00
A. Warne, hanging baskets, second premium,	2 00

We, the undersigned, appointed judges, certify that the foregoing awards are correct.

W. J. CHENNICK,
A. D. ROHRER,
ROBERT CRAIG.

Outside Decoration.

W. H. Wyatt, first premium,	$50 00
David Furguson & Son, second premium,	30 00
Alburger & Bro., third premium,	20 00
Christian Eisele, fourth premium,	10 00

The undersigned, duly appointed judges, hereby certify that the premiums for outside decoration are correct, and would respectfully suggest, as one of the conditions of future exhibits, that all plants should be cleaned and have the dead foliage removed before being staged, and that failure to comply with this condition would render the exhibit liable to be considered ineligible for competition.

J. W. CHENNICK,
A. S. ROHRER,
ROBERT CRAIG.

CLASS 55—Cut Flowers and Designs.

Craig Bro., bride's bouquet, first premium,	$5 00
Pennock Bro., bride's bouquet, second premium,	3 00
Pennock Bros., hand bouquet, first premium,	10 00
Craig Bro., hand bouquet, second premium,	5 00
Pennock Bro., corsage bouquets, first premium,	5 00
Heron & Nesbit, corsage bouquets, second premium,	3 00
Pennock Bro., plateau of cut flowers, twenty-four inches, first premium,	10 00
Craig Bro., plateau of cut flowers, second premium,	5 00
Craig Bro., plateau of ferns and foliage, first premium,	5 00
Craig Bro., handle basket of cut flowers, first premium,	5 00
Pennock Bro., handle basket of cut flowers, second premium,	3 00
Hugh Graham & Co., large wedding design, first premium,	75 00
Charles Fox, large wedding design, second premium,	50 00
Faust & Crawford, large wedding design, third premium,	25 00
Charles Fox, three designs of immortelles, first premium,	10 00
Eugene Weiss, three designs of immortelles, second premium,	5 00
Christian Eisele, three designs of immortelles, third premium,	3 00
W. H. Smith, design ornamental dried grasses,	5 00

The committee make special mention of the fine display of designs of immortelles and dried flowers exhibited by Eugene Weiss.

Henry A. Siebrecht,
Edwin Lawnsdale,
Robert Kift,
J. W. Colflesh,
Joseph McMurray,
Committee.

David Ferguson, general collection cut flowers, first premium,	$15 00
H. A. Dreer, collection double dahlias, first premium,	3 00
W. H. Moon, collection double dahlias, second premium,	2 00
David Ferguson & Son, single dahlias, first premium,	3 00
H. A. Dreer, geraniums, first premium,	3 00
H. A. Dreer, gladiolas, first premium,	3 00
W. H. Moon, gladiolas, second premium,	2 00
Wm. Sutherland, verbenas, first premium,	3 00
H. A. Dreer, petunias,	3 00
L. Motsch, china asters,	3 00
Walter W. Coles, carnations,	3 00
Walter W. Coles, roses,	5 00

Joseph McMurray,
Thomas Foulds,
Robert Kift,
Committee.

Large Designs—Cut Flowers.

Hugh Graham & Co., first premium,	$75 00
Christian Eisele, second premium,	50 00
Joseph Kift & Son, third premium,	30 00
LaRoch & Stahl, fourth premium,	20 00

Table Designs—Cut Flowers.

W. H. Wyatt, first premium,	20 00
Charles Fox, second premium,	15 00
Pennock Brothers, third premium,	10 00

JOSEPH MCMURRAY,
WM. N. CRAWFORD,
DAVID CLIFF,
Committee.

Funeral Designs.

Hugh Graham & Co., three funeral emblems,	$30 00
Craig & Brother, three funeral emblems,	20 00
William H. Wyatt, three funeral emblems,	10 00

Original Funeral Emblems.

Hugh Graham & Co.,	20 00
J. Kift & Son,	10 00
Christian Eisele,	5 00
Charles Fox, pillow,	5 00
W. H. Wyatt, cross,	5 00
Charles Fox, cross,	3 00
Pennock Brothers, anchor,	5 00

DAVID N. SCHUYLER,
E. S. EARLEY,
L. C. BANMANN,
A. J. BAIR,
JOSEPH M. MURRAY,
Committee.

Pennock Brothers, table decoration for dinner, first premium,	$75 00
Charles Fox, table decoration for dinner, second premium,	50 00
Faust & Crawford, table decoration for dinner, third premium,	30 00
Hugh Graham & Co., table decoration for dinner, fourth premium,	20 00

The table decoration taking fourth premium was so judged because it was deemed unsuitable as a dinner or luncheon table decoration, being too stiff and crowded; although good flowers were used, the design was not considered appropriate.

HENRY A. SIEBRECHT,
ROBERT CRAIG,
EDWIN LANSDALE,
JOSEPH MCHENRY,
WILLIAM H. WYATT,
Committee on Awards.

J. Kift & Son, pendant design, first premium,	$10 00

HENRY A. SIEBRECHT,
ROBERT CRAIG,
EDWIN LANSDALE,
JOSEPH MCHENRY,
WILLIAM H. WYATT,
Committee on Awards.

DEPARTMENT 3.—Implements and Machinery for Transportation and Agriculture.

GROUP XVII—Transportation.

CLASS 56—Freight and Business Vehicles.

D. McMurray, farm wagons,	Bronze Medal.
Gere, Truman, Platt & Co., patent farm wagon,	Bronze Medal.
R. G. Parvine, farm wagon for hauling hay,	Bronze Medal.
Edward Neil, agent, farm wagon,	Bronze Medal.
J. R. Fitzhugh, water cart,	Diploma.
W. H. Hoag & Co., Webster farm-wagon,	Diploma.
W. H. Atkinson, Webster farm-wagon,	Bronze Medal.
Barton Manufacturing Co., hay wagon,	Diploma.
Frank E. Scherer, business wagon,	Diploma.
George Langert & Son, express wagon,	Diploma.
Levering & Co., business wagon,	Diploma.
George Langert & Son, collection business wagon,	Silver Medal.
John Beggs & Son, police patrol wagon,	Diploma.
W. H. English & Co., plumber's wagon,	Bronze Medal.
Fulton, Walker & Co., wagons,	Silver Medal.
Frank C. Scherer, light business wagons,	Diploma.
B. H. Kemble, light business wagons,	Bronze Medal.
W. H. Jones, wagon for spreading manure,	Diploma.
L. Rodenhauser, coal wagon,	Diploma.
B. H. Kemble, delivery wagon,	Diploma.
W. & J. H. Lonhardt, coal wagon,	Diploma.
B. H. Kemble, milk wagon,	Diploma.
Jacob Reach, milk wagon,	Diploma.
M. G. Hubbard, Torsion springs,	Diploma.
Edward Neal, agent, butcher's wagon,	Diploma.
J. L. Worrell, trucks,	Diploma.
Charles T. Shreve, hoods for vehicle tops,	Diploma.
Fulton, Walker & Co., stage, (half omnibus,)	Diploma.
Heald & Jones, carriage axle used without lubricating,	Diploma.
Philadelphia Shifting-Seat Phæton Co., extension phæton,	Diploma.
J. L. Baldwin & Son, folding-top carriage,	Diploma.
Edward Edgerley, two-seat carriage,	Diploma.
Philadelphia Shifting-Seat Phæton Co., standing-top phæton,	Diploma.
Norbeck & Meiley, standing-top phæton,	Diploma.
McLear & Kendall, assortment carriages,	Silver Medal.
C. J. Calvert, lady's phæton,	Diploma.
J. D. Harper, jump-seat phæton,	Diploma.
J. L. Baldwin & Son, lady's phæton,	Bronze Medal.
J. L. Baldwin & Son, physician's phæton,	Diploma.
A. H. English & Co., buggy spar-spring,	Diploma.
J. J. Sowney & Bros., buggies,	Bronze Medal.
J. L. Baldwin & Son, spar-spring buggy,	Diploma.
J. L. Baldwin & Son, buggies, top and no top,	Diploma.
C. J. Calvert, collection of buggies,	Silver Medal.
J. D. Harper, buggies, top and no top,	Silver Medal.
Seckler & Co., road carts,	Diploma.
C. J. Calvert road carts,	Diploma.

J. D. Harper, road carts,	Diploma.
Lewis & Coster, road carts,	Diploma.
C. J. Calvert, five road carts,	Diploma.
Levin Wagner, one horse sleigh,	Diploma.
R. M. Barthwaite & Co., two sleighs,	Diploma.
McLean & Kendall, two sleighs,	Diploma.
J. D. Harper, one sleigh,	Diploma.

Having examined all the vehicles in the foregoing classes, your committee are impressed with the skill and workmanship displayed in their construction, and have arranged the various premiums annexed to each. In many cases we find it difficult to decide between the exhibits, many of them being of superior excellence.

W. W. BOYER,
W. F. RUTHERFORD,
IRA TRIPP.

GROUP XVIII.--Clearinr, Filling and Planting.

CLASS 59—TURNING AND WORKING SOIL.

CLASS 60—PLANTING AND SOWING.

Syracuse Plow Company, best collection plows,	Silver Medal.
Chas. A. Jenkins, jointer attached to plows,	Diploma.
D. Landreth & Son, walking cultivator, "Iron Age,"	Diploma.
Hench & Dromgold, sulky cultivator, (pin hole,)	Diploma.
Hench & Dromgold, cultivator, (spring hole,)	Diploma.
S. L. Allen & Co., hoe harrows,	Diploma.
H. C. Evans & Co., scratch harrows,	Diploma.
D. Landreth & Son, clod crusher,	Bronze Medal.
D. Landreth & Son, collection spades, shovels, and hoes,	Diploma.
W. H. Jones, iron roller,	Diploma.
D. Landreth & Son, forks,	Diploma.
D. Landreth & Son, garden tools,	Diploma.
C. J. Calvert, sod cutter,	Diploma.
C. J. Calvert, transplanter and cutter,	Diploma.
W. H. Haag & Son, slip point plow-shares,	Diploma.

To the President and members of the Executive Committee:

Your committee, appointed to judge in classes 58 and 59, beg leave to report:

First. That the exhibits in these classes are of the finest, latest, and most approved character. The manufacturers and their representatives have justly merited the thanks of the Society for their very large and meritorious exhibit. Notably among the exhibitors are the Syracuse Chilled Plow Company, of Syracuse, New York. They exhibit some thirty-three different kinds and styles of plows, consisting of a full line of wood, iron, and steel beams, two and three horse—right and left hand, also a swivel plow in wood and steel beams, and various other plows of different descriptions, and for various kinds of work, sulky plows, etc., etc.

The Wiard Plow Company also makes a large and grand display, reflecting much credit to themselves and the Society. They also exhibit a full line of sulky plows.

The opinion quite generally held by the farmers of the Eastern States that the sulky plows are adapted only to smooth land, that is free from stones, like the Western prairies, does not appear to hold good in regard to the sulky plow of to-day. This sulky plow has expressly been made for hard clay, cobble-stony, and uneven farms of the large section above mentioned. It is perfectly balanced, working without strain on the horses' necks, and absolutely without side draft; and now looks as though it is the plow that has come to stay with us. Farmers have given their testimonials as being of light draft, etc.

Pennock Sons & Co. have upon the ground their improved road scraper.

Asay & Woods enter a corn-planter with distributor and cultivator attached, which appears to be a valuable device for the purpose for which it is intended. Also many others, one and two-horse planters, that are worthy of especial merit.

The Dutton Mower Knife Grinder is a novel device, attached to the wheels of the mower or reaper, and looks in the direction of supplying a long-felt need.

Chas. M. Ghriskey exhibits quite a display of lawn mowers.

The Williams lawn mower, manufactured by W. L. Nassau, it may be mentioned, that, owing to the large driving wheels, it is speeded much higher, and is so constructed that it will cut high or low.

C. J. Calvert enters Calvert's Sod and Transplanter and Cutter. The planter cuts and raises the sod in sections, and it is claimed to do the work of fifty men. Many other exhibits, that time and space prevent your committee from giving a more extended report of their respective merits, we have awarded respectively agreeable to their numbers.

David H. Branson,
J. A. McKean.

GROUP XIX.--Gathering Crops.

CLASS 61—Mowing and Reaping.

CLASS 62—Lifting and Storing.

Mr. President and Gentlemen of the State Agricultural Society:

Your committee, appointed to judge in Classes 61, and 62, beg leave to report that we have carefully examined all the exhibits in the above classes and find them all to be of superior excellence, and to reflect much credit upon manufacturers and exhibitors, and inasmuch as no practical test can be had of any of their respective merits, your committee did not feel that an intelligent award could be made to any, yet your jury was satisfied that all could do good work, and hope at some future time a thorough and practical test may be had.

All of which is most respectfully submitted.

David H. Branson,
J. E. Rutherford,
J. A. McKean.

GROUP XX—Preparing Products for Market and Consumption.

CLASS 63—Dairy Fittings and Appliances.

George D. Shubert, Philadelphia, collection dairy apparatus,	Silver medal.
Mrs. B. Smith, butter color,	Diploma.
Clements & Dunbar, Philadelphia, collection cedarware, &c.,	Silver medal.
P. Embrie & Son, butter-worker,	Diploma.
E. T. Kleuck, stopper for milk-cans,	Diploma.

A. Wilhelm, *President:*

Your committee examined carefully the collection of machines and appliances for dairy purposes, exhibited by G. W. Shubert, A. H. Reed & Co., J. S. Conley, Mosley & Pritchard Manufacturing Company, Vermont Farm Machine Company, Paul J. Reed & Co., and Embrie & Son, and it affords us sincere pleasure to declare they are all entitled to the confidence and patronage of the farmers. We were unable to determine the relative value of the different creameries, churns, butter-workers, and presses without subjecting them to competitive tests, which we could not do, and have not awarded any premiums. Mr. Shubert's display of tin vessels for handling milk was large, made of the best materials, and the workmanship of unusual excellence. The collection of articles exhibited by Clement & Dunbar was very large, well adapted to the purposes for which they were made, and certainly unsurpassed in quality of material and workmanship.

GEORGE RHEY,
J. E. ALLEN.

CLASS 65—FLOUR AND FEED-MAKING.

S. L. Wilson, thresher,	Silver medal.
A. B. Farquhar, thresher,	Bronze medal.
S. B. Minnich, hand hay press,	Bronze medal.
L. M. Crosby & Son, grain fan,	Bronze medal.
Thompson & Campbell, portable grist mill,	Bronze medal.
P. P. Mast & Co., feed mill,	Diploma.
James Thornton, corn sheller,	Bronze medal.
A. B. Farquhar, corn sheller,	Diploma.
Heebner & Son, feed cutter and crusher,	Diploma.
A. B. Farquhar, cornstalk cutter,	Diploma.
A. B. Farquhar, power hay press,	Bronze medal.
Thomas G. Smedley, steam-generator,	Bronze medal.

CLASS 66—PREPARING PRODUCTS OTHER THAN ABOVE.

Thompson & Campbell, portable bone mill,	Silver medal.
P. P. Mast & Co., cider mill and press,	Diploma.
Charles F. Henis, fruit and vegetable strainer,	Diploma.
George B. Boomer, cider press,	Bronze medal.
George B. Boomer, cider and wine filter,	Bronze medal.
J. L. Worrell, bag holder,	Diploma.
South Side Manufacturing Company, fruit baskets,	Bronze Medal.
Williams Manufacturing Company, truck baskets,	Diploma.
South Side Manufacturing Company, fruit grater,	Diploma.
South Side Manufacturing Company, berry boxes,	Diploma.

Your committee on classes 65 and 66 would respectfully report that they have carefully examined all the implements that they could find, as they were scattered around. Your committee would respectfully recommend that next year you have all power and hand machines together. Some of the implements entered were not on the grounds, and others did not have entry cards attached.

All of which is respectfully submitted.

W. W. SPEER,
JAMES A. MCKEAN,
G. W. CRAWFORD.

GROUP XXI.--Miscellaneous.*

W. H. Hoog & Son, patent fence machine,	Diploma.
Edward P. Sutton, woven wire fencing and gates, hole diggers, automatic gate,	Diploma.

The committee, upon several occasions, endeavored to determine the relative merits of the wind-mills on exhibition. While all appeared meritorious, in many instances the exhibitors were not present to represent their respective mills. One or two who were present stated that they would not be ready for a week. The recent removal of the mills from their former location, and changes made by the order of the Society, leave the mills in such condition that the committee are unable to make satisfactory awards, and we desire to report that each exhibitor deserves great credit for the excellent display in this class, and express the hope that full justice may be done the several exhibitors at the next meeting of the Society.

Walter Sellers, agent for James Pyle & Son, Pyle's Pearline, washing powder,	Bronze medal.
Sudsena Manufacturing Company, washing powder,	Diploma.
Empire Horse and Cattle Company, Thorley's food for horses and cattle,	Diploma.
M. O. Roberts, horse-power endless floor,	Diploma.
A. B. Farquhar, lever horse-power,	Bronze medal.
Daniel Hulshizer, Excelsior horse-power, with thresher and separator combined,	Bronze medal.
Daniel Hulshizer, 2 horse-power mounted on wagon,	Diploma.
Daniel Hulshizer, 1 horse-power mounted on wagon,	Diploma.
Keystone Portable Driller Company, portable steam drill for artesian wells,	Bronze medal.

Would recommend that one of the wells sunk be arranged for by the Society.

Joseph Fitzwater & Son, Model well-driller,	Diploma.
Albert S. Houldsworth, machine for making pop-corn, and appliances,	Diploma.
West Point Engine and Machine Company, Farmers' Delight engine, (portable,)	Bronze medal.
West Point Engine and Machine Company, semi-portable engine,	Diploma.
Harrisburg Foundry and Machine Company, plain portable engine, twelve horse-power,	Diploma.
David Lupton, revolving refrigerators,	Diploma.
William MacDonald, fret-saw work in white holly,	Worthy of favorable notice.
Paris Manufacturing Company, collection sewing-tables,	Diploma.
" " " step-ladders,	Diploma.
A. B. Farquhar, steam traction engine,	Bronze medal.
Harrisburg Foundry and Machine Company, Paxton steam traction engine and water-cart combined,	Diploma.
A. B. Farquhar, farm engine,	Bronze medal.
Harrisburg Foundry and Machine Company, Ide Paxton Electric Automatic Cut-off engine, (stationary,)	Bronze medal.
Daniel Hulshizer, horse-power governor,	Diploma.
W. B. Logan, junior, collection horse-shoes,	Diploma.

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* Note—Nearly all the exhibits under the head "Miscellaneous," belong to other classes. They appear to have been thrown together here through clerical errors.

W. B. Logan, junior, set horse-shoes, ...	Diploma.
W. V. Rambo, general agent, manufacturing fertilizers, .	Diploma.
W. B. Harvey, Harvey's calf-weaner and anti-cow sucker, .	Diploma.
D. E. Longsdorf, machine for cutting green corn off cob, .	Bronze medal.
George B. Boomer, apple grater and cider mill, . . .	Diploma.
William Shaling, Mount Joy, stock-releasing device, . .	Silver Medal.
Victor Manufacturing Company, Newburyport, Massachusetts, wrought-iron door-roller and door, ...	Diploma.

PHILADELPHIA, *October 1, 1885.*

A. WILHELM, *President of Pennsylvania State Agricultural Society:*

SIR: The committee appointed to judge and make awards in Groups 9, 10, and 21, (miscellaneous,) as referred to them in this book, submit the preceding.

After many days' labor, largely increased by the fact that the exhibits referred to them were distributed in different parts of the buildings, thus adding materially to their work, they have examined all the exhibits in the groups referred to, (as far as they could find the same,) and have made the above report and awards therein contained.

L. A. MACKEY,
J. B. G. KINSKE.

The Continental Filter Manufacturing Company, of Philadelphla, placed on exhibition at the State Fair, held in Philadelphia, in September and October, 1885, one of their large filters, which was in actual, practical operation. It was conneeted with a two inch water pipe and was supplied with water from the city reservoir; the water being in a very turbid condition. The water after passing through the filter, supplied ten (10) aquaria or glass tanks in which was placed the display of the State Fishery Commissioners, consisting of trout, bass, carp, ides, &c., &c.

The water supplied from the filter to these tanks was so clear that visitors could look through the tanks filled with water and see objects upon the other side with such clearness and distinctness as was surprising, showing that the apparatus did its work perfectly.

The whole force of water from the two inch pipe passed through the filter day and nigqt for a period of over two weeks, and at no time was it lessened, but was forced to supply the tanks in order to give the fish fresh water.

The construction of the filter is simple, and the arrangements for cleaning it and the filter-bed are perfect.

The cleansing is done with either the water pressure, with steam, or with both, and can be manipulated by any person.

Under the aquaria for the display of trout, large cedar tanks were arranged in which were placed iron cylinders about twelve inches in diameter, forming a part of the circulating system; these were designed for cooling the water, the tanks were kept filled with ice, thus reducing the temperature of the trout aquaria to about forty degrees.

This same system used for supplying cold drinking water, would make a simple and effective arrangement.

From the actual test made of over two weeks, your committee recommends the highest award, a silver medal and diploma, and desires to add its approval to the many others as to the merits of the apparatus and recommends it to the public.

D. W. SEILER,
Chairman.

TRIAL OF FRUIT EVAPORATORS.

Mr. President and Gentlemen: Your committee appointed to conduct the trial of fruit-evaporators beg leave to report that after a careful and exhaustive test of their respective merits, including time consumed, cost of evaporation, quality of work done, &c., it is very difficult for your committee to decide as to the superiority of any of the three evaporators there in the contest, viz: The Zimmerman Manufacturing Company, Burlington, Iowa, the American and Pneumatic, by Vermont Farm Machine Company—the Pneumatic, catalogue price, $80; American, $85; Zimmerman, $100. One barrel of apples was provided for each competitor, all of which did their work well. The quality of evaporated fruit did great credit to the representatives of the respective dryers. The parties representing the Zimmerman were not experts and did not make as good a showing. The contest evidently was between the Pneumatic and American. Pneumatic having a drying capacity, and being rather a quicker dryer, did its work more rapidly.

D. BRENSON,
Chairman.

OFFICERS

OF THE

SOCIETY OF ARTS,

COMPOSING THE EXECUTIVE COMMITTEE.

PRESIDENT.
JOHN HUNTER.

VICE-PRESIDENTS,
CLEMENT R. HOOPES,
CYRUS CHAMBERS, JR.,

TREASURER,
F. GUTEKUNST.

SECRETARY,
GEO. G. FRYER.

JOHN LUCAS,
JAS. W. WHITE, M. D.,
JAS. L. BRANSON,
WM. G. FISCHER,
A. L. KENNEDY, M. D.,
WM. H. MCCALLUM.

COMMITTEE OF ARRANGEMENT OF THE PENNSYLVANIA STATE FAIR, 1885. SECTION II.

JNO. G. BAKER,
CYRUS BORGNER,
CYRUS CHAMBERS, JR.,
ELBERT A. CORBIN,
CHAS. W. ERVEIN,
WM. G. FISCHER,
GEO. G. FRYER,
FRED. R. GILLINDER,
EDWARD H. HANCE,
CLEMENT R. HOOPES,
JOHN HUNTER,
RUDOLPH M. HUNTER,
ALFRED L. KENNEDY,
BURNET LANDRETH,
CHAS. H. LE FEVRE,
JOHN LUCAS,
WM. H. McCALLUM,
FRANK W. McDOWELL,
JOHN MUNDELL,
ISAAC M. SIMONIN,
WM. WATERALL.

SUB-COMMITTEES OF THE COMMITTEE OF ARRANGEMENT.

Motive Power.—G. G. Fryer, *Chairman*, 1816 Chestnut St.; E. A. Corbin, J. G. Baker.

Installation.—B. Landreth, *Chairman*, 21 South Sixth St.; J. Lucas, A. L. Kennedy.

Textile Products.—W. H. McCallum, *Chairman*, Glen Echo Carpet Mills; I. M. Simonin, F. W. McDowell.

Building and Annexes.—A. L. Kennedy, *Chairman*, Polytechnic College; J. Hunter, W. H. McCallum.

Music and Fine Arts.—Wm. G. Fischer, *Chairman*, 1210 Chestnut St.; E. A. Corbin, C. Borgner.

Educational and Scientific Appliances.—C. H. Le Fevre, *Chairman*, 230 North Fifth St.; E. H. Hance, R. M. Hunter.

Leather and Rubber and their Manufactures. — John Mundell, *Chairman*, Thirteenth and Cherry Sts.; I. M. Simonin, G. G. Fryer.

Pottery and Glassware.—F. R. Gillinder, *Chairman*, 135 Oxford St.; C. Chambers, Jr., C. Borgner.

Paints, Drugs, and Chemicals.—J. Lucas, *Chairman*, 141 and 143 North Fourth St.; Wm. Waterall, E. H. Hance.

Sanitary, Heating, Lighting, and Sporting Appliances.—C. R. Hoopes, *Chairman*, 1330 Buttonwood St.; Wm. Waterall, C. W. Ervein.

Metal Products, including Machinery.—G. G. Fryer, *Chairman*, 1816 Chestnut St.; C. R. Hoopes, C. Chambers, Jr.

Objects used in Building, Furnishing, and Decorating Edifices.—W. G. Fischer, *Chairman*, 1210 Chestnut St.; R. M. Hunter, C. Borgner.

Competitive Cooking Appliances.—C. H. Le Fevre, *Chairman*, 230 North Fifth St.; G. G. Fryer, E. A. Corbin.

Statement of F. Gutekunst, Treasurer of Society of Arts.

November 1, 1885.

RECEIPTS.		EXPENDITURES.	
To cash rec'd for rent of space,	$2,987 66	By 200 H. P. boiler, stack, etc.,	$1,189 95
" " " concessions,	989 62	" insurance and inspection of same,	20 00
" " " extra electric light,	132 50	" coal,	221 50
" " " premiums: Strawbridge & Clothier,	200 00	" wages of engineers, firemen, clerks, etc.,	511 99
" " " discount on bill,	1 62	" police for main building,	561 41
		" janitors for main building,	424 58
		" superintendent and assistants,	175 00
		" renovating and cleaning main building,	73 68
		" carpenter work on main building and boiler house,	125 00
		" pulley for main shafting,	30 00
		" partitions for gallery of main building,	175 00
		" incidentals,	263 74
		" furniture for office,	36 06
		" extra electric lighting,	156 00
		" premiums offered for dressmaking,	200 00
		" balance on hand,	147 49
	$4,311 40		$4,311 40

Annual dues of members not taken into this account.

ASSETS.		LIABILITIES.	
Cash on hand,	$147 49	Steam-pipe, safety-valves, and erecting, etc.,	$1,744 89
Due by State Agriculture Society, as per agreement,	423 61	Pipe covering,	77 19
Balance due from Guarantee Fund of State Agricultural Society,	1,903 36	Shafting and pulleys,	79 59
		Alterations and erecting boiler house,	138 73
		Plumbing,	57 86
		Rent of office,	75 00
		Secretary's expenses,	150 00
		Electric lighting,	151 20
	$2,474 46		$2,474 46

Pennsylvania State Agricultural Society in account with Society of Arts.

November 1, 1885.

To police for main building, as per agreement,	$561 41	By 21 electric lights, 18 days, from September 24 to October 14 inclusive, at 40c. per light,	$151 20
" repairs to foundation of main engine,	26 95	" pipe fitting for glass blowers,	7 15
		" gas, 3200 feet at $2 per M.,	6 40
		" balance,	423 61
	$588 36		$588 36

V *b*. PENNSYLVANIA STATE FAIR, 1885. SECTION II. SCHEDULE OF CLASSIFCIATION.

DEPARTMENT IV—MINERALS, METALS, MACHINERY, AND TOOLS, General.

GROUPS.		CLASSES.	PREMIUM LIST, NOS.
XXII.—Minerals and Metals,	67.	Ores and Combustible Minerals. 68. Building, Refractory, Plastic and Grinding Stones. 69. Metals Cast, Forged, and Rolled,	1600—1641
XXIII.—Moters and Means for Transmitting Power,	70.	Engines. 71. Power Distributors,	1645—1682
XXIV.—Pumps and Blowers,	72.	Raising and Forcing Water. 73. Compressing Air,	1690—1714
XXV.—Working Wood and Metal,	74.	Wood Working. 75. Metal Working,	1720—1784
XXVI.—Removing Stone and Working Clay,	76.	Quarrying and Cutting Stone. 77. Brick and Tile Making,	1788—1806
XXVII.—Leather and Textile Machinery,	78.	Making and Working Leather. 79. Fibre Manufacturing,	1815—1860
XXVIII.—Printing, Telegraphy, and Electric Lighting,	80.	Printing and Paper Machinery, Tools, and Appliances. 81. Telegraphy and Electric Lighting,	1867—1901
XXIX.—Implements of Surgery, and Apparatus for Chemical Industries,	82.	Surgical Instruments. 83. Apparatus for General Chemical Industries,	1910—1953

DEPARTMENT V—MANUFACTURES, General.

GROUPS.		CLASSES.	
XXX.—Fibrous Products,	84.	Unwoven. 85. Woven and Felted Fabrics. 86. Apparel,	1955—2018
XXXI.—Factory Products from Flour and Sugar,	87.	From flour. 88. From sugar,	2022—2028
XXXII.—Skins, Horns, and Feathers, and their Manufactures,	89.	Skins; Dressed and Tanned. 90. Manufacturers of Leather, Horn, and Feathers	2030—2056
XXXIII.—Oils, Fats, and Soaps,	91.	Fats and Fixed Oils. 92. Soaps and Perfumery,	2060—2073
XXXIV.—Paints, Drugs, and Chemicals,	93.	Paints and Colors. 94. Drugs and Chemicals,	2081—2106

DEPARTMENT VI—HOME AND SOCIAL IMPROVEMENT.

GROUPS.		CLASSES.	
XXXV.—Furniture,	95.	Furniture of Wood. 96. Furniture, other than of Wood,	2110—2124
XXXVI.—Tableware and Household Machines,	97.	Plate and Cutlery. 98. China and Glassware. 99. Household Machines,	2130—2163
XXXVII.—Heating, Cooking, Ventilating, and Lighting,	100.	Warming Apparatus. 101. Culinary Appliances. 102. Ventilation. 103. Artificial Illumination,	2170—2214
XXXVIII.—Buildings, Enclosures, and Roads,	104.	Buildings and Fencing. 105. Roads, Walks, Enclosures,	2220—2244
XXXIX.—Water Supply and Drainage,	106.	Supplying Waters to Buildings and Grounds. 107. Draining,	2250—2270
XL.—Education and Natural Science,	108.	Educational Means and Incentives. 109. Instruments of Precision,	2276—2316
XLI.—Fine Arts,	110.	Carved and Moulded. 111. On Paper and Canvas,	2320—2353
XLII.—Music and Out-door Sports,	112.	Instruments of Music. 113. Implements for Out-Door Sports,	2360—2382
XLIII.—Unclassified,	186.	Articles belonging to Section II, and in none of the preceding Groups,	2785—2800

1885. PENNSYLVANIA STATE FAIR. 1885.

RULES AND REGULATIONS OF SECTION II,

COMPRISING

MACHINERY AND MANUFACTURES NOT AGRICULTURAL.

UNDER THE MANAGEMENT OF THE SOCIETY OF ARTS.

1. The exhibition will open Wednesday, September 23, at ten o'clock, A. M., and close Wednesday, October 14, at six o'clock, P. M.

2. Competition is open to the people of all the States of the Union.

3. No entry fee is required for objects exhibited under this Section, but floor space within the Main building and its annexes will be charged for at the following rates, viz: For ten square feet or under, $2 00; for each additional square foot on ground floor of Main building, 15 cents; in galleries or annexes, 10 cents. Wall space in Main building, including galleries, 15 cents per square foot; in annexes, 10 cents. Applicants who have been allotted floor space in front of and adjoining a wall are entitled, without further charge, to a wall space equal in width to their floor space, and as high above the floor as the sills of the windows. All bills for space must be paid at the time the allotment is made.

4. Blank forms of application for space will be furnished gratuitously. These must be filled up by applicants.

5. A limited quantity of steam and steam-power will be supplied gratuitously to exhibitors of machinery in motion. The quantity will be settled definitely at the time of the allotment of space. Any power required by an exhibitor in excess of that then obtained will be furnished at a fixed price, which must be paid at the time his requisition is granted. The main lines of pipe for steam and drainage will be laid by the Society, but exhibitors must make all connections. Joints in steam-pipes will not be permitted over thoroughfares.

Two lines of shafting $2\frac{7}{16}$ inches diameter, and having velocities of 120 and 240 revolutions per minute respectively, extend lengthwise of the building at the height of 22 feet from the floor. Countershafts, pulleys on the main shafts, and all necessary appliances must be furnished by exhibitors at their own cost. Main shafts must not be key-seated, and pulleys must not exceed three feet in diameter. They must be of the kind known as balanced split pulleys.

Applications for motive power must be made before September 10; they must state actual horse-power required, and width of face and diameter of pulley.

Exhibitors will be required to maintain supervision over all gear supplied by them, and to furnish attendants to operate their machinery. This must be inclosed by a railing of the uniform height of 2 feet 10 inches.

6. When an allotment of space has been definitely made, the applicant will be notified and a permit and bill for space sent him.

When his articles arrive at the entrance gate, this permit, together with a receipted bill for the space, must be shown at the office of the Secretary of the Society of Arts in the Main building. It will there be indorsed. Without this indorsement, objects can neither be unpacked nor arranged for exhibition. A card obtained at the Secretary's office, and containing number, class, group, and brief description, must in all cases be affixed to an object before it is arranged.

7. All articles must be within the building on Monday, September 21, in order that they may be arranged for examination by the juries.

8. All exhibitors are required to give personal attention to their articles, and at the close of the exhibition to attend to their removal. Exhibitors must show their permits for space to the superintendent in charge before attempting to remove their objects.

9. The books of entry will be opened at the office, No. 411 North Thirteenth street, Philadelphia, on Tuesday, July 21, and will positively be closed against all further entries Wednesday, September 16, at ten, P. M.

10. The building will be opened for the reception of exhibits on Monday, September 9. All expenses of transportation, and of transfer to the space allotted, must be paid by the owner or agent.

11. All articles consigned for exhibition in Section II should be addressed to the name of the person exhibiting, care of the Secretary of the Society of Arts, Philadelphia.

12. Exhibitors will give the name of the patentee, (if any,) also the name and post-office direction of the manufacturers.

13. Exhibitors are requested to place railings of approved design around the space allotted to them. Such railings must be of the height of 2 feet 10 inches above the level of the floor of the building. The floor space granted includes the space covered by the railing. Platforms, cases, counters, railings, and signs must so conform to the lines of the passageways as not to project into them. The size of signs must not exceed 1,000 square inches. Cards, circulars, samples, etc., can be distributed only from the space of the exhibitor who issues them.

14. No exhibitor will be permitted to display products in such a manner as to obstruct the light or the vistas through the passages, or injuriously affect the displays of other exhibitors. Cases and partitions must not exceed the height of 15 feet above the floor of the building, except by special permission.

15. During the days of the exhibition, a police force will be on duty, and watchmen during the night, but all exhibits will be at the owner's risk.

16. Patent medicines and articles that are in any way dangerous or offensive will be excluded from the exhibition.

17. Exhibitors must provide at their own cost such foundations as their exhibits may require. The floor may be cut for such foundations only on permission obtained in writing from the chairman of the Committee of Installation. Permits for the space in which such foundations are required should be applied for immediately after the entry books are opened, in order that ample time be obtained for construction.

18. Permits for space cannot be divided, transferred, or otherwise disposed of without the written consent of the chairman of the Committee of Installation. Allotted space not occupied on September 16 will revert to the Society for re-allotment.

19. No removal of exhibits will be permitted prior to the close of the exhibition, except by written consent of the chairman of the Committee of Installation.

20. No special pavilions or other constructions can be erected without the written approval of the chairman of the Committee of Installation.

21. The premiums awarded will be furnished by the Pennsylvania State Agricultural Society, and, unless otherwise indicated, will comprise three grades: A Silver Medal, a Bronze Medal, and a Diploma. At the discretion of the Society of Arts, a report by experts, attested by the jury on the class to which the prize-winning article belongs, may be made to replace the premium awarded it.

22. No person will be allowed to interfere with the juries while in the discharge of their duties; and any person interfering, by letter or otherwise, will be excluded from competition.

23. Unless the contrary be specially stated, no article can take more than one premium.

24. When there is but one exhibitor under a premium list number, the jury will not award a premium, unless the entry is of unusual excellence or of decided general value.

25. Articles for which no premiums are offered will be entered in the class to which they properly belong, and will be passed upon by the jury on that class. The jury may recommend such premiums as its judgment may dictate, but each of these awards, which must not exceed a diploma or a bronze medal, will be subject to the approval of the Executive Committee of the Society of Arts.

26. All superintendents and others in charge will be subject to the instructions of the Committee of Arrangement.

27. No diploma will be awarded by juries, or allowed by the Society, for any object on exhibition, unless the object is entitled to a premium of ten dollars or more; in other terms, the Society deems the diploma to possess value equal to a cash premium of ten dollars. The exhibitor entitled to a prize will be at liberty to commute a money premium for a diploma, but not the award of a diploma into a money premium.

28. Cash premiums will be paid by the Treasurer of the Pennsylvania State Agricultural Society, Wednesday and Thursday, October 14th and 15th, at his office, on the exhibition grounds. Exhibitors to whom premiums have been awarded must apply after that date, in person or by letter to the Treasurer, at Harrisburg.

29. Premiums will not be paid on articles removed from the exhibition without the written approval of the President of the Society of Arts.

30. Persons to whom medals and diplomas have been awarded will please furnish their full names and directions to the Secretary of the Society of Arts. After allowing time for their proper preparation, medals and diplomas will be delivered to exhibitors entitled to receive them, or forwarded to them free of charge, in such manner as they may direct.

31. Premiums of every description awarded must be claimed within twelve months from the time of award, or they will be deemed forfeited.

JOHN HUNTER,
President.

GEORGE G. FRYER,
Secretary.

PENNSYLVANIA STATE FAIR, 1835. SECTION II.

[President Hunter to President Wilhelm.]

SOCIETY OF ARTS,
OFFICE, 411 N. THIRTEENTH STREET.
PHILADELPHIA, *November 1, 1885.*

A. Wilhelm Esq., President Pennsylvania State Agricultural Society:

DEAR SIR: I have the pleasure to send you herewith copies of the reports made to me, by the juries of award on Departments IV, V, and VI, composing Section II, Pennsylvania State Fair, 1885, under the management of this Society.

Respectfully yours,
JOHN HUNTER, *President.*

DEPARTMENT IV—Minerals, Metals, Machinery, and Tools—General.

GROUP XXII—Minerals and Metals.

CLASS 67.—ORES AND COMBUSTIBLE MINERALS.

We, the undersigned, jurors on Class 67, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for reasons annexed:

Premium List No.		
1600.	C. Wharton, red hematite mass, remarkable for its size,	Honorable Mention.
1607.	Agassiz Association, collection of minerals,	Honorable Mention.

JAMES W. WHITE,
PEDRO G. SALOM,
EDWARD C. KIRK,
Jury.

CLASS 69—METALS—CAST, FORGED, AND ROLLED.

We, the undersigned, jurors on Class 69, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.		
1627.	John H. B. Miller, horse-shoes, best exhibit and workmanship,	Diploma.
16 6.	Bryden Horse-Shoe Company, Catasauqua machine made shoes,	Diploma.
1635.	Bradly & Co., chains,	Diploma.
1620.	Hoopes & Townsend, bolts and nuts,	Diploma.
1640.	Welsh & Lea, carriage bolts and nuts,	Diploma.
1642.	Thos. S. Sparks, bar lead and shot,	Diploma.
1634.	James Rowland, cut nails,	Diploma.
1628.	Hughes & Patterson, a full exhibit of iron manufactured, showing superior quality, workmanship and finish,	Bronze Medal.
1641.	— Maguire, for his patent horse-shoe, which has considerable merit,	Diploma.

JOS. E. THROPP,
JAWOOD LUKENS,
JEROME KEELEY,
Jury.

GROUP XXIII—Motors and Means for Transmitting Power.

CLASS 70—Engines.

We, the undersigned, jurors on Class 70, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed :

Premium List No.		
1647.	The Southwark Foundry, for best Stationary Engine,	Gold Medal.
1662.	W. H. Edgerton, for the best Electro Magnetic Motor,	Gold Medal.
1665.	The Rue Manufacturing Company, for Boiler Injectors, ...	Bronze Medal.

The exhibit of S. L. Wilson, having been made by different persons, having already, as we understand, been examined by another jury of the State Fair, and the fact that he is merely the agent for the sale of same, we have not made any award.

Respectfully submitted by

Wm. Barnet LeVan,
F. G. Jahn, M. E.,
Jury.

CLASS 71.—Power Distribution.

We, the undersigned, jury on Class 71, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed :

Premium List No.		
1677.	Henry D. Miller, asbestos and hair felting pipe jacketing,	Diploma.
1683.	Chalmer, Spence & Co., pipe jacketing, ...	Diploma.
1676.	George V. Cresson, machine shafting and couplings,	Silver Medal.
1681.	R. C. Gedder, collection rubber belting, ...	Diploma.

Thomas Wilbrahem,
John B. Fontaine,
Jury.

GROUP XXIV.—Pumps and Blowers.

CLASS 72.—Raising and Forcing Water.

CLASS 73.—Compressing Air.

The jury on Classes 72 and 73, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed :

Premium List No.		
1693.	A. L. Jones, best collection of pumps for wells, . . .	Diploma.
1711.	Wilbrahem Brothers, pressure blower, ...	Silver Medal.
1695.	Wilbrahem Brothers, rotary force pump, ...	Silver Medal.
1689.	Fire extinguishers on exhibition by J. Cooper and C. Hallon & Son should be tested before any award is made.	

Henry I. Snell,
Chairman.

GROUP XXV—Working Wood and Metal.

CLASS 74—WOOD WORKING.

We, the undersigned, jurors on Class 74, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.

1723. H. Disston & Sons, collection of hand tools for working wood, superior workmanship, material, and excellence of finish, ... Silver Medal.
1737. H. Disston & Sons, mill saws, best collection, . Bronze Medal.
1720. E. & F. Gleason, best collection of wood-working machinery, including wood-sawing machines, two sizes, improved jointer and facer, and improved panel-planer, all of which are well built and well adapted to their purposes, possessing novel and original features, ... Gold Medal.
1739. H. Disston & Sons, "American" miter-machine, for utility and novelty, ... Diploma.

WM. B. BEMENT,
WM. H. THORNE,
Jury.

CLASS 75—METAL WORKING.

We, the undersigned, jurors in Class 75, Pennsylvania State Fair, 1885' having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.

1754. J. E. Mitchell, Philadelphia, grindstones for farm and shop use, with a convenient adjustable rest for grinding plane irons, &c., ... Diploma.
1746. Hughes & Patterson, Philadelphia, working model, one third size of a rolling-mill, with Lloyd's patent clutch and stop-motion, ... Diploma.

WILLIAM B. BEMENT,
WILLIAM H. THORNE,
FRANK GLEASON,
Jury.

GROUP XXVI—Removing Stone and Working Clay.

CLASS 77—BRICK AND TILE MAKING.

We, the undersigned, jurors on Class 77, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.

1802. To Chambers Bros & Co. Brick Machine. It takes the clay directly from the bank; it tempers the clay and makes the brick stiff enough to stack eight or ten high under the sheds, avoiding the expense of spreading them on the floors to dry, and any loss from rain. It is more complete in all its mechanical arrangements, and better adapted to the end in view than its competitors, ... Silver Medal

Premium List No.		
1807.	To Chambers Bros. & Co. Brick Press, for improvements for pressing brick a uniform thickness,	Silver Medal.
1804.	To Chambers Bros & Co., for Brick Kilns, Grates, and Doors, ...	Bronze Medal.

HOWARD YONKER,
JOHN W. SHAFER,
Jury.

GROUP XXVII—Leather and Textile Machinery.

CLASS 79—FIBER MANUFACTURING.

The jury on Class 79, being fiber manufacturing, performed by any of the leading classes of machinery, by which cotton, wool, and silk are worked from the original fiber to the finished goods, beg leave to report:

That they regret the absence of many classes of machinery, known to be in operation in the mills of this city and vicinity, among which we may name carding machines, self-acting mules, cotton goods looms, steaming and bleaching apparatus, singeing machines, calendering machines, hemp and jute, preparing and spinning, silk reels, silk ribbon looms, wool washers, whip braiding machines, and dryers. All these have a real place in the industries of Philadelphia, and might, perhaps, be brought out in future exhibitions of the Society.

Premium List No.		
1859.	James L. Branson, power knitter, ...	Silver Medal.
1859.	James L. Branson, seamless knitter, ...	Silver Medal.
1859.	James L. Branson, automatic fancy ribber, ...	Silver Medal.

The actual exhibits of the present time are described under No. 1859 of the premium list, Class 79, namely: The power knitter and the automatic ribber, which is a separate machine from the seamless knitter, but shown by the same exhibitor. We find these machines operated by power with success and efficiency, and we recommend them as being of decided general value, and worthy of the silver medal designated as the premium awarded for the power knitting machine in operation.

LORIN BLODGETT,
THOMAS A. PEARCE,
BENJAMIN ALLEN,
Jury.

To the President of the Society of Arts:

SIR: The jury on Class 79 beg to make an informal recommendation in submitting their report, to have the effect, if possible, of bringing out more complete trials of the actual work of the very valuable machinery for the manufacture of fiber. Such machines should be required to produce the best work of which they are capable, and should be operated by the most skillful hands.

In the exhibit for which awards are now given, the Branson knitter could be, and it is in several mills, most successfully worked on silk and Lisle thread, making fine silk hosiery, silk gloves, nubias, sleeves, &c., and also making every variety of Lisle thread articles known to the trade. It is also used for making a fashionable shirred dress trimming, much in use the present season, and quite a novelty in the appearance and mode of manufacture.

These are most desirable and useful improvements, and precisely such as the Society of Arts desires to promote.

Very respectfully,

LORIN BLODGETT,
Chairman of Jury, Class 79.

PHILADELPHIA, *October 10, 1885.*

GROUP XXVIII.—Printing, Telegraphy and Electric Lighting.

CLASS 81—TELEGRAPHY AND ELECTRIC LIGHTING.

The jury on Class 81, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed:

Of all the electrical appliances, etc., those relating to the generation of electricity and electric lighting, were rented, and not in competition, and the electric motors were rented for a special exhibit of sewing machines, and were not even entered as exhibits.

Dr. Stevens entered an exhibit for the treatment of diseases by electricity and polarization, but it is on the theory, and not on the apparatus, that he claims novelty, there is, therefore, nothing tangible to make any award upon.

Premium List No.		
1902.	An exhibit is made by the American Galvanic Company, of 42 East Ninth street, New York, of the various apparatus there manufactured. Your jury would recommend "The Howard Electro Magnetic Truss." It is made so perfectly adjustable that it will adapt itself to the requirements of any case of hernia, and being provided with a series of replaceable pads of different shapes, the belt may be readily made to suit rupture of all kinds or shapes. It is so simple in construction, and easily adjusted, and also capable of being made right or left, that it is worthy of particular mention and the award of a . . .	Diploma.
1889.	The most perfect, and the best, of the electric apparatus upon the grounds is that of the Thomson & Houston Electric Light Company, who, while showing an excellent construction of dynamo-electric machines and arc lamps, combine with the circuits and brushes, suitable regulating devices for automatically regulating the supply of electricity in accordance with the demands, thus enabling one or more lamps to be turned off without endangering the machine or the remaining lamps in circuit. It is by far the most perfect system exhibited, and, therefore, we award them the	Silver Medal

Yours respectfully,

R. M. HUNTER,
Chairman of Jury.

GROUP XXIX—Instruments of Surgery and Apparatus for Chemical Industries.

GROUP XXX—Oils, Fats, and Soaps.

GROUP XXXIV—Paints, Drugs, and Chemicals.

CLASS 83—APPARATUS FOR GENERAL CHEMICAL INDUSTRIES.

CLASS 91—FATS AND FIXED OILS.

CLASS 94—DRUGS AND CHEMICALS.

We, the undersigned, jurors on Classes 83, 91, and 94, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.		
1933.	Enterprise Manufacturing Company, coffee, spice, and drug mills,	Diploma.
1919.	Globe Manufacturing Company, bottle filler,	Diploma.
1940.	Borgner & O'Brien, retort for generating illuminating gas,	Diploma.
1933.	A. W. Straube, coffee mill,	Diploma.
1933.	A. W. Straube, spice mill,	
1920.	C. Lippincott, soda-water apparatus,	Diploma.
2106.	Hance Bros. & White, chemical and pharmaceutical preparations,	Silver medal.
2106.	William N. Warner, sol. coated pills,	Bronze medal.
2106.	William N. Warner, granules and parrules,	
2106.	William N. Warner, medical fluid extract,	
2106.	William N. Warner, pharmaceutical preparations,	
2109.	H. W. Waas, cramline tooth-powder,	Honorable mention.
2109.	H. W. Waas, coraline tooth-powder,	
2669.	Cocoanut Oil Manufacturing Company, cocoanut oil,	Diploma.
2107.	J. Jay Brown, method of repairing terra-cotta by cement,	Honorable mention.
1945.	Richard C. Remmey, chemical stone ware,	Diploma.

JOSEPH D. MARSHALL,
EDWARD C. JONES,
Jury.

CLASS 92.—SOAPS AND PERFUMERY.

We, the undersigned, jurors on Class 92, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.		
2072,	Authur Fricke, perfumery, first premium,	Bronze Medal.
2072,	McCambridge & Son, perfumery, second premium,	Diploma.
2075,	Wm. Marks, soap polish,	Honorable Mention.
2074,	Wrigley Manufacturing Company, mineral scouring soap,	Honorable Mention.
2073,	Robert Shoemaker & Co., flavoring extracts,	Diploma.
2076,	Charles S. Rees, bath flesh cleaners,	Diploma.
2070,	Van Hagen Soap Manufacturing Co., soaps,	Bronze Medal.

JOS. D. MARSHALL,
EDWARD C. JONES.
Jury.

CLASS 93—PAINTS AND COLORS.

We, the undersigned, jurors on Class 93, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.

2088. To Messrs. John Lucas & Co., a bronze medal, for best collection of colored paints and their pigments, the same being remarkable for tasteful and beautiful arrangement, as well as for the brilliancy and variety of shades displayed.

NICHOLAS LENNIG,
WM. WATERALL,
SAM'L K. FELTON,
Jury.

DEPARTMENT V.—Manufactures, General.

GROUP XXX—Fibrous Products.

CLASS 84—UNWOVEN.

CLASS 85—WOVEN AND BELTED FABRICS.

CLASS 86—APPAREL.

We, the undersigned, jurors in Classes 84, 85, and 86, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed.

In the cases where but one exhibitor under the list has appeared, we have awarded prizes when, in our opinion, the entry was ot unusual excellence and of general value.

Premium List No.		
1996.	A. C. Yates & Co., men and boys' clothing, . . .	Silver medal.
1958.	John J. Bailey & Co., ropes, cordage, twine, bags, &c.,	Silver medal.
1993.	John Bromley & Sons, carpets and Smyrna rugs, .	Diploma.
1993.	John Bromley, Brussels and Wilton carpets, . . .	Bronze medal.
2005.	Richard Levick, Son & Co., rubber goods, . .	Silver medal.
2010.	Jacob J. Whilt & Co., ladies' wrappers and aprons, underwear, and children's dresses, ...	$5 00
2002.	Daniels & Co., collection of art needle-work and stamped goods, ...	5 00
1987.	Jacob Crouse & Son, Axminster carpets, ...	Bronze medal.
1987.	Jacob Crouse & Son, Wilton, Brussels, and tapestry carpets, ...	Bronze medal.
2009.	Burdenwerper & Dothmer, shirts, ...	$5 00
2019.	London, Quiler & Co., system of dress-making from paper-patterns, ...	5 00
2003.	Chicago Corset Company, corsets, ...	5 00
2005.	Robert C. Geddes, rubber goods, ...	Bronze medal.
1955.	Brainard & Armstrong, silks and silk goods, . . .	Bronze medal.

CHARLES SPENCER,
GEORGE W. EMLEN,
Jury.

CLASS 86—Continued. (Special dress-making premiums offered by Strawbridge & Clothier.)

The conditions of the competition for both classes were as follows:

1. The competitor must reside in Pennsylvania.
2. The dress must have been made since January 1, 1885.

3. The material must be wool or silk, the color and quality being left to the discretion of the maker.

4. The entry must be made by Tuesday, September 15, 1885, and must state bust measure of garment.

5. Competitors must state on their entries whether they are professional dressmakers or not, so that the exhibits can be properly classified.

As a guide in making the awards, the jury will consider

1. Workmanship,	5 points.
2. Economy of material,	3 points.
3. General effect,	3 points.

Should the jury be unable to decide between two or more dresses, they may consider any other feature that will enable them to arrive at a fair decision. Forms for displaying the dresses will be furnished free of charge, and a careful attendant will be in the department during the exhibition.

We, the undersigned, jurors on Class 86, Pennsylvania State Fair, 1885, having carefully examined the objects referred to us, concur in recommending the following awards, for the reasons annexed:

By Professional Dress-makers.

Dress No. 3.	Brown combination, very good in all points, first prize, Miss M. A. Foley, 2057 Brandywine street, Phiadelphia,	$50 00
Dress No. 6.	Home spun, general effect and workmanship, second prize, Miss M. Phillips, 1314 Stiles street, Philadelphia,	25 00
Dress No. 1.	Neatness and style, third prize, Miss K. A. Donahue, Kennett Square, Pa.,	15 00
Dress No. 25.	Workmanship and economy of material, fourth prize, A. A. Shepler, Harrisburg, Pa.,	10 00

MRS. L. L. DUFFIELD,
MRS. L. A. COOPER,
MRS. S. LAND, *Jury.*

By Non-Professional Dress-makers.

Dress No. 27.	Home spun, excellent in style and finish, first prize, Ella L. Murphy, 1722 North Tenth street, Philadelphia,	$50 00
Dress No. 72.	Combination, neatness of workmanship, second prize, Nina E. McKeever, 1924 North Twenty-third street, Philadelphia,	25 00
Dress No. 11.	General effect and careful workmanship, third prize, Mrs John Pilley, 2015 North College avenue, Philadelphia,	15 00
Dress No. 18.	Combination, stylish and workmanship good, fourth prize, Miss M. W. Reeves, 1623 Green street, Philadelphia,	10 00

A dress sent in for competition, made by a seventeen-year-old Indian girl, although it did not take the prize, is well worthy of notice, showing as it does, that the Indians can be taught the principles of civilization if only pains are taken to instruct them. This dress compared favorably for style and workmanship with many others on exhibition, the sewing was neatly done, and the button-holes, always a difficult portion of the dress, well finished.

MRS. S. A. GALE,
MRS. CAROLINE WETHERILL,
MISS EDITH WEYLON, *Jury.*

GROUP XXXI—Factory Products of Flour and Sugar.

CLASS 87—FROM FLOUR.

The jurors on Class 87, Pennsylvania State Fair, having carefully examined the exhbiits referred to them, concur in recommending the following awards for the reasons annexed:

Premium
List No.
2022. David Carrick & Co., best collection of crackers, cakes, and cocoanut macaroons, ... Bronze Medal.
2022. C. Martin, agt., almond and chocolate macaroons, . . Diploma.

WM. MCMULLIN, *Chairman.*

CLASS 88—FROM SUGAR.

We, the undersigned, jurors on Class 88, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium
List No.
2027. A. J. Chaveau, confectionery, best display, ... Silver Medal.
2027. W. L. & M. Brown, confectionery, second display, Bronze Medal.
2028. Job Smith, manufacture of confectionery, best display, Silver Medal.
2028. J. J. & S. W. Williams, manufacture of confectionery, second best display, ... Bronze Medal.
2028. J. Ross Edmeston, salt-water taffy, ... Diploma.
2029. H. O. Wilbur & Sons, chocolates, best display, Silver Medal.
2029. Philadelphia Cocoanut-Oil Manufacturing Co., desiccated cocoanut, ... Diploma.
2029. Henry W. Wass, tonic cocoa, ... Diploma.

STEPHEN WHITMAN,
WM. D. MILLER. *Jury.*

GROUP XXXII—Horns, Skins, Feathers, and their Manufacture.

CLASS 89—SKINS DRESSED AND TANNED.

The jurors on Class 89, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed:

Premium
List No.
2030. Kennedy, Willing & Co., furs and sleigh-robes, best collection, ... Bronze Medal.

F. G. JAHN, *Chairman.*

CLASS 90—MANUFACTURES OF LEATHER, HORN AND FEATHER.

We, the undersigned, jurors on Class 90, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium
List No.
2043, A. J. Treitt, assortment of whips and canes, . . . Bronze Medal.
2041, Patrick McFadden, improvement in harness, . . . Bronze Medal.
2051, John Mundell & Co., boots and shoes, . . . Silver Medal.
2046, Charles Jones & Son, horse blankets, etc., ... Diploma.
2041, Melleck & Coleman, harness specialties, . . . Bronze Medal.
2056, W. C. Randolph, display vegetable and elephant ivory, Diploma.

JAMES A. HAYES,
J. P. TWEDDELL, *Jury.*

DEPARTMENT VI.—Home and Social Improvement.

GROUP XXXV—Furniture.

CLASS 95—FURNITURE OF WOOD.

We, the undersigned, jurors on Class 95, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.		
2110.	Philip Shafer, parlor furniture,	Bronze medal.
2112.	Philip Shafer, bed-room furniture,	Bronze medal.
2110.	Christ Bros., rattan chairs,	Diploma.
2111.	George Bremm, folding-tables,	Diploma.
2115.	Samuel Lehman, coiled-wire spring mattrass,	Diploma.
2117.	Martin Free, window shades,	Diploma.
2110.	W. C. Henszey, Jr., silk screens,	Diploma.
2113.	A. H. Andrews & Co., pulpit and other ornamental church furniture,	Diploma.

IRA E. WALRAVEN,
H. LEJAMBRE, *Jury.*

CLASS 96—FURNITURE OTHER THAN OF WOOD.

We, the undersigned, jurors on Class 96, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for reasons annexed:

Premium List No.		
2124.	Ridgeway Refrigerator Company, refrigerators,	Silver medal.
2124.	George T. Thackara, refrigerators,	Diploma.
2125.	C. J. Pease, toilet ware,	Diploma.

I. E. WALRAVEN,
H. LEJAMBRE.

GROUP XXXVI—Table Ware and Household Machines.

CLASS 98—CHINA AND GLASS-WARE.

The jurors on Class 98, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed:

Premium List No.		
2140.	Willett Manufacturing Co., porcelain breakfast, dinner, and tea sets, best collection,	Silver Medal.
2141.	Willett Manufacturing Co., single piece,	Bronze Medal.
2140.	Menke & Devitt, porcelain breakfast, dinner, and tea sets,	Bronze Medal.
	Menke & Devitt, stone fruit-jars,	Diploma.
2142.	Tyndale, Mitchell & Co., queensware breakfast, dinner, and tea sets,	Silver Medal.
2143.	Tyndale, Mitchell & Co., single piece,	Bronze Medal.
2144.	Gillender & Sons, table glassware, best collection,	Silver Medal.
2145.	W. C. Henszey, Jr., Japanese crockery, best collection,	Diploma.
2146.	Madam Norce, glass-blowing and work in same,	Diploma.
2147.	Frank Walcott, iron-slag ware,	Diploma.

CHAS. A. DUHRING,
Chairman.

CLASS 99.—HOUSEHOLD MACHINES

We, the undersigned, jurors on Class 99, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for reason annexed:

Premium List No.

2150. Davis Sewing Machine Company, 1223 Chestnut street, Philadelphia. Davis sewing machine has no feeder, takes silk or leather with same needle, does a variety of work without change of attachments, . . . Silver Medal.

2152. W. D. Stoops & Co., 17 South Eighth street, Philadelphia. Household sewing machine, best for household purposes, easily made ready for plain sewing, Bronze Medal.

W. D. Stoops & Co., best display of fancy work, Diploma.

2150. American Button-hole Machine Company, 1709 Chestnut street, Philadelphia. Button-hole attachment adapted to heavy or factory work, Honorable Mention.

2156. American Machine Company, Lehigh avenue and American street, Philadelphia. Collection including wringer with galvanized springs, fluting machine and hand fluters, ice clippers, tobacco cutters and shavers, Christmas tree holders, cake mixers, . Diploma.

2146. Enterprise Manufacturing Company, Third and Dauphin streets. Collection including Mrs. Potts' cold handle sad iron, meat choppers, sausage stuffers, self-measuring faucets, and smoked beef shavers, . Diploma.

2154. F. Dodd, 19 South Ninth street, best steam washer, rotary, . . . Bronze Medal.

2164. Christ Brother, Arch street below Ninth, Excelsior carpet sweeper, ... Diploma.

2158. Christ Brothers, iron fluter and Fox sad iron, . Diploma.

MRS. JOHN LUCAS,
MRS. ROBERT G. SPENCER,
GEORGE H. ATKINSON, *Jury.*

GROUP XXXVII—Heating, Cooking, Ventilating, and Lighting.

CLASS 100—WARMING APPARATUS.

The jury on Class 100, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed:

Premium List No.

2182. Daniel Mershon's Son, patent shaking grate, ... Diploma.

2177. Abram Cox Stove Co., for "Premier No. 12" office or parlor stove, ... Bronze Medal.

2179. Abram Cox Stove Co., for "Novelty" portable heater, Silver Medal.

2172. W. W. Patton, hot-water grate, ... Bronze Medal.

F. G. JAHN,
Chairman of Jury.

CLASS 101—CULINARY APPLIANCES.

We, the undersigned, jurors on Class 101, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for reasons annexed:

Premium List No.

2186. Abram Cox Stove Company, range, "Superb," . . . Silver Medal.

2187. I. B. C. Burpee, hotel kitchener, ... Bronze Medal.
2185. F. H. Eldridge, self-basting broiler, ... Diploma.
2192. Wellington McNall, roaster, ... Diploma.
2194. Robt. Porter & Son, family oil can, . . . Diploma.

Mrs. Mary P. Chambers,
Mrs. Nettie L. Le Fevre,
Jury.

CLASS 103—Artificial Illumination.

The jurors on Class 103, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed :

Premium List No.

2212. A. J. Weidner, lamps and lamp fixtures, best collection, Bronze Medal.
2215. A. J. Weidener, "Champion" lamp, ... Diploma.
2210. Penn Globe Gas-Lighting Co., gas machine for dwellings, ... Silver Medal.

F. G. Jahn.
Chairman.

GROUP XXXVIII—Buildings, Enclosures, and Roads.

CLASS 104—Buildings and Fencing.

The jury on Class 104, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed :

Premium List No.

2221. Gummey, Speering, Ingram & Co., tin shingles, ornamental, durable, and cheap, . . Silver Medal.
2237. C. W. & H. W. Middleton, fencing and tools—strength and durability, . . Diploma.
2222. Trinidad Asphaltum Company, asphaltum paving blocks, ... Diploma.
2237. A. Rimbey, inside blind sliding, ... Diploma.
2238. Beale & Bangs, aërial fire escape, ... Diploma.
2233. Farrel & Co., fire and burglar proof safes, . Bronze Medal.
2237. Manley & Cooper, ornamental iron work, ... Diploma.
2239. Land & Ratheen, sash cord fasteners, ... Diploma
2232. Linninger & McCarthy, cellar door fastener, . . Diploma.
2222. Excelsior Brick Company, enameled and pressed Shelcher bricks, ... Diploma.
2222. D. Graham, machine-made bricks, ... Diploma.
2225. D. Pettit & Co., ornamental iron post, ... Diploma.
2222. Borgner & O'Brien, fire bricks, ... Diploma.

Finley Hutton,
Chairman Jury.

CLASS 105.—Roads, Walks, and Enclosures.

We, the undersigned, jurors on Class 105, Pennsylvania State Fair, 1885, having examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed :

Premium
List No.

2241. Penn Artifical Stone and Fire Proof Company, artifical stone, ... Bronze Medal.
2214. Henry Pettit, iron work for garden and lawn, . . . Silver Medal.
2244. Samuel J Creswell, iron work for gardenand lawn, . Bronze Medal.

JAMES W. WHITE,
PEDRO G. SULOM,
EDWIN C. KIRK.
Jury.

GROUP XXXIX—Water Supply and Drainage.

CLASS 106—SUPPLYING WATER TO BUILDINGS AND GROUNDS.

We, the undersigned, jurors on Class '06, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards, for the reasons annexed:

Premium
List No.

2259. Noppel Filter Company, Philadelphia, pressure filter for dwellings, ... Bronze Medal.
2254. Haines, Jones & Cadbury, Philadelphia, plumbers' work and materials, ... Diploma.

C. HENRY RONEY,
RUDOLPH HERING,
Jury.

CLASS 107—DRAINAGE.

We, the undersigned, jurors on Class 107, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium
List No.

2270. Haines, Jones & Cadbury, water-closet and fixtures, the "Perfection," . . . . . Diploma.
2271. Austin, Opdyke & Co., corrugated water-pipe conductor, Diploma.

RUDOLPH HERING,
C. HENRY RONEY,
Jury.

GROUP XL—Education and Natural Science.

CLASS 108—EDUCATIONAL MEANS AND INCENTIVES.

The jurors on Class 108, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed:

Premium
List No.

2281. Roberts & Co., artificial slate surface, . . Diploma.
2293. A. H. Andrews & Co., best display of school material, Bronze Medal.
2300. Alvah Bushnell, letter-copying book, ... Diploma.
2276. A. H. Andrews & Co., ingenious globes, . Diploma.
2295. A. H. Andrews & Co., Sunday-school bench, for utility, Diploma.
2295. L. B. McClees & Co., Sunday-school bench, for finish and beauty, ... Diploma.
2280. L. B. McClees, wall slates and largest board, . . Bronze Medal.
2294. L. B. McClees, School Desk, ... Diploma.

2294. A. H. Andrews & Co., school desk, for beauty and superior finish, ... Diploma.
2291. Agassiz Association, insectivorous birds, . Silver Medal.
2292. Agassiz Association, insects injurious to vegetation, . Bronze Medal.
2288. Agassiz Association, botanical illustrations, . . Diploma.
2281. L. B. McClees & Co., crystal boards, . . Honorable Mention.
2276. E. H. Butler & Co., maps of own manufacture, . . Diploma.
2300. J. B. Lippincott & Co., fine display of school-books, . Diploma.
2301. Ella F. Hansell, Modoc girl, Indian School, Philadelphia, map drawing, ... Diploma.
2301. Eddie Bettleyour, Indian School, Philadelphia, penmanship, ... Diploma.

Lucretia M. B. Mitchell.
Chairman.

CLASS 109—Instruments of Precision.

We, the undersigned, jurors on Class 109, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.

To Prof. Lubin, for improved self-adjusting eye-glasses and compound prism glasses, ... Bronze Medal.
2317. Fairbanks & Co., general line of scales of reliable and and excellent workmanship, ... Bronze Medal.

T. W. Trœmner,
Henry M. Knox,
Jury.

GROUP XLI—Fine Arts.

CLASS 110—Carved and Moulded.

Having examined the Premium List No. 2336, we consider it a remarkably fine collection, and award

Premium List No.

2236. William H. Warner, ... Silver Medal.

CLASS 111—On Paper and Canvas.

We, the undersigned, jurors on Class 111, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.

2345. F. Gutekunst, Philadelphia, photographs, ... Silver Medal.
2345. Chandler & Sheets, photographs, ... Diploma.
2345. Louis Walker, photographs, ... Diploma.

W. Curtis Taylor,
DeWitt C. Williams,
Jury.

GROUP XLII—Music and Outdoor Sports.

CLASS 112—Instruments of Music.

The jury on Class 112, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for the reasons annexed:

Premium List No.		
2361.	Scherzer, best exhibit of pianos,	Silver medal.
2361.	M. W. Lang & Co., second best exhibit of pianos,	Bronze medal.
2363.	Estey, Bruce & Co., best exhibit of parlor organs, one bench of keys,	Silver medal.
2366.	Musical cabinet. A cleverly constructed cabinet, containing a number of moving figures, but not considered entitled to an award.	

S A. STERN,
Chairman.

CLASS 113—IMPLEMENTS FOR OUT-DOOR SPORTS.

We, the undersigned, jurors on Class 113, Pennsylvania State fair, 1885, having carefully examined the exhibits referred to us, concur in recommending the following awards for the reasons annexed:

Premium List No.		
2381.	William Wurflein, best collection of sporting and gallery rifles,	Bronze Medal.
2382.	R. A. Humphreys & Co., camp and camping utensils, tents, cots, etc.,	Bronze Medal.
2382.	R. A. Humphreys & Co., horse and wagon covers,	Diploma.
2384.	George Doll, pipes, canes, etc.,	Diploma.
2385.	W. C. Henszey, Jr., Japanese bamboos,	Diploma.
2375.	A. J. Reach, best collection of implements for out-door sports,	Bronze Medal.
2371.	G. D. Gideon, "Victor" bicycle,	Bronze Medal.
2372.	G. D. Gideon, "Humber" tandem tricycle,	Bronze Medal.

A. BERNARD CHAMBERS,
ROBERT E. HASTINGS,
Jury.

GROUP XLIII—Unclassified.

CLASS 114—ARTICLES BELONGING TO SECTION II, AND IN NONE OF THE PRECEDING GROUPS.

The jury on Class 114, Pennsylvania State Fair, 1885, having carefully examined the exhibits referred to them, concur in recommending the following awards for reasons annexed:

Premium List No.		
2740.	Monumental Bronze Company, monument, excellent material and workmanship,	Diploma.
2750.	H. M. DuBois, wheels, spokes, and hubs, excellent material and workmanship,	Diploma.
1560.	Globe Manufacturing Company, general exhibit,	Meritorious.
1561.	Eastern Manufacturing Company, outside window-cleaner,	Meritorious.
2752.	Geo. C. Howard, safety clutch for elevators,	Diploma.
1673.	Powell Motor Company, spring motor,	Diploma.
1469.	Henry Morris, power ice-cream freezers,	Bronze Medal.
2751.	Geo. B. Soley, smallest medal,	Diploma.

J. HOWARD CHAMBERS,
F. G. JAHN,
Jury.

PREMIUMS FOR CROPS--1886.

FIELD CROPS.

The book of entry for the following awards remains open until December 31. They are made at the annual meeting of the Society at Harrisburg, on the third Wednesday of January, 1887. All letters relative to the subject, or samples, directed to the Society, at Harrisburg, will receive attention.

Competitors for premiums for agricultural products *must* present *a full statement* of the mode of cultivation, and the kind of seed used. The ground must be in one contiguous piece, to be measured by a surveyor, with chain and compass, who shall make affidavit in the usual form before a magistrate, to the correctness of the measurement of the land cultivated.

All of the corn competing for the five-acre crop, and all of the corn competing for the one-acre crop, must be shelled and measured between the first and last days of December, and the number of bushels certified to by the affidavit of the owner, and of some person who assisted the owner to shell and measure the same; affidavits to be made before a magistrate in the usual form.

The grain to be measured by weight, according to the legal standard.

The competitor must also exhibit a sample of each crop, not less than one peck, at the meeting in Harrisburg, on the third Wednesday in January. The sample to be the property of the Society.

No award of premiums will be made unless there is competition.

	Premium.
Corn, 75 bushels per acre, best five acres,	$20 00
Corn, not less than 80 bushels—shelled, 56 pounds to the bushel; on the cob, 70 pounds to the bushel—best acre,	10 00
Wheat, best five acres,	20 00
Wheat, not less than 35 bushels of 60 pounds, best acre,	10 00
Rye, best five acres,	15 00
Rye, not less than 40 bushels, 56 pounds to the bushel, best acre,	10 00
Barley, best five acres,	15 00
Barley, not less than 50 bushels, 47 pounds to the bushel, best acre,	10 00
Oats, 75 bushels per acre, best five acres,	15 00
Oats, not less than 80 bushels, 30 pounds to the bushel, best acre,	10 00
Timothy seed, 45 pounds to the bushel, best half acre,	10 00
Clover seed, 64 pounds to the bushel, best half acre,	10 00
Potatoes, not less than 200 bushels, 58 pounds to the bushel, best acre,	20 00
Table potatoes, not less than 150 bushels, best acre,	15 00
Table potatoes, best half acre,	10 00
Carrots, 60 pounds to the bushel, best acre,	10 00
Carrots, 60 pounds to the bushel, best half acre,	10 00
Rutabaga, 60 pounds to the bushel, best acre,	8 00
Rutabaga, 60 pounds to the bushel, best half acre,	8 00

Mangel wurzel, 69 pounds to the bushel, best quarter acre, . . .	$10 00
Turnips, best quarter acre, ...	5 00
Sweet potatoes, 56 pounds to the bushel, best quarter acre, .	10 00
Tobacco, best half acre, ...	10 00
Best five acres of young timber in Pennsylvania, raised from seed or planted out within three years. Timber to be of the kind used for fence or building purposes, ...	50 00

PREMIUMS FOR REPORTS AND ESSAYS—1886.

Competitors must furnish the Secretary of the State Society with their papers before the first day of November, 1886.

No limit can be properly fixed for essays, but they may cover about twenty-four pages of cap, written on one side of the paper, corrected ready for the press. Rejected essays will be returned upon application to the Secretary.

	Premium.	
For the best report of the exhibition of 1886 published in any newspaper or periodical, or furnished the State Society in MS.; if published in a newspaper, four copies to be furnished, ...		$20 00
* Best report of experiments on the saving, preparing, and applying of liquid manures, ...	Silver Cup or	50 00
To the farmer who presents the best form of farm accounts for the year, ...	Silver Cup or	25 00
Best report of experiments made to determine the relative advantages of the systems of soiling and of grazing cattle or sheep, .		25 00
Best report by owner on the construction and cost of extensive and successful works completed in Pennsylvania within the last ten years, for the permanent reclamation of land from overflow, and on the subsequent treatment of the land in detail, its progress and results. Plans and specifications to accompany the report, ...	Silver Cup or	30 00
Best essay on the most effective methods by which the district school may be made to inculcate the duty of humanity to animals.	Silver Cup or	35 00
Best essay on the importance in Pennsylvania of utilizing water for the purposes of irrigation, and on the most economical and effective methods to be pursued in irrigating. Plans and specifications to accompany the essay. . . .	Silver Cup or	35 00
Best essay on the means by which the productiveness of the mountain lands of Pennsylvania may be most largely and profitably increased, through the general introduction of sheep husbandry in the region,	Silver Cup or	35 00

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* Reports for this premium must give plans and specifications of the cistern or vats for securing the manure, the cost of the same, and the materials used in its construction; also, drawings and descriptions of the implements used for the distribution and application of the manure, and the method and time of applying the same, with the results as applied to grass lands and vegetable crops of not less than two acres.

PAPERS READ
AT THE
CENTENNIAL MEETING
OF THE
PHILADELPHIA SOCIETY FOR PROMOTING AGRICULTURE,
AND REPORTED BY THE SOCIETY.

HISTORICAL SKETCH OF THE SOCIETY.

By GEORGE BLIGHT.

With the arrival of this year, 1885, this Society commemorates the venerable age of one hundred years. It is proper we should take notice of it, and recall some of the prominent events which have marked its existence, and the men who tried to promote its usefulness and strove to carry out the objects of its formation.

On the 11th day of February, 1785, the following men met at a public house on Water street, having the "Sign of the Cock," and formed the Philadelphia Society for Promoting Agriculture: Richards Peters, Gen. John Cadwalader, Col. George Morgan, Col. John Nixon, Thomas Willing, Samuel Meredith, Edward Shippen, Benjamin Rush, John Jones, Adam Kuhn, George Logan, George Clymer, Henry Hill, Philemon Dickinson, Samuel Vaugh, Tench Frances, Charles Thompson, Samuel Powel, Lambert Cadwalader, John Boardley. To this list many honorary members were added: George Washington, Timothy Pickering, Elias Boudinot, William Bingham, Charles Carroll, Robert Milligan, Reuben Haines, and many others. These are familiar names, and recognized by all Philadelphians as distinguished in the various occupations of life. When the war of the Revolution had closed, and the independence of the country had been recognized by the governments of Europe, they laid aside the implements of war and exchanged them for the plow, and endeavored to promote a fondness for the pursuits of peace, which alone would strengthen the nation.

The early transactions of this Society have been carefully preserved, and show how much care and attention were bestowed upon the cultivation of the soil; also the trial of experiments to test the value of plants as adapted to this region. These minutes embrace the period between 1785 and 1810—when no doubt a change in the secretary occurred, who failed to preserve the records. It is not improbable that the second war with England interfered with the meetings of this Society, as no regular minutes of its proceedings can be found. Our library contains a volume in which several interesting agricultural addresses may be found—delivered in the years 1818, 1820—one delivered by Chief Justice Tilghman, in 1822; by Hon. Nicholas Biddle, in 1822; by Richard Peters, in 1824; by Matthew Carey, and also by Robert S. Vaux. These were delivered at the annual meetings in January, and are evidences of the active workings of the Society.

In 1818, this Society issued an address to the people of Pennsylvania asking them to aid in the establishment of a Pattern Farm, where experiments could be made and young men educated in the science of agriculture. Many large subscriptions were obtained, but it was an undertaking too gigantic for that period to accomplish.

In 1832, the publication of the *Farmer's Cabinet* was commenced, and much pertaining to agriculture can there be found. From this journal we learn that it was not until 1838 that our venerable Society resumed active work. It takes great pleasure in announcing in its editorial column that this Society had been revived under the most favorable auspices. For various reasons it had been allowed to languish—in fact, laid dormant for years. It makes an appeal to the farmers of Philadelphia county, and Pennsylvania in general, to come forward and aid the noble cause.

At the annual meeting, held on the 23d of January, 1838, the Society was re-organized by the election of Mr. Nicholas Biddle as President; Dr. James Mease and Joseph Cloud as Vice Presidents; Algernon S. Roberts as Treasurer, and Kenderton Smith as Secretary; Committee of Correspondence, Richard Peters and R. A. Parrish. In November of the same year the first exhibition was held at Rising Sun hotel, on the Germantown road, three miles from the city. It was attended with great success. The committee of arrangements were: Kenderton Smith, Nicholas Biddle, James Thornton, Isaac W. Roberts, James Gowen, John Fox, Robert Parrish. The only improved breed then recognized was the Durham Shorthorn. Mr. Charles Wolbert took the first prize for his white bull "Colostria," Mr. Thomas Botch for his bull "Bruce," Mr. Isaac W. Roberts, for his fat steer, and Mr. Algernon S. Roberts, for his native cow.

At the annual meeting in 1839, the same officers were elected, with the addition of Mr. Sidney G. Fisher as Corresponding Secretary—which office he held until his death, in 1864. From this period, 1839, the Society became an active organization, holding regularly its monthly meetings and the annual meetings alternately at the Rising Sun hotel and at Glenn's hotel, on the Lancaster turnpike, one and a half miles from Market street bridge. To advance the cause of agriculture, and to pay the premiums offered, application was made to the Legislature for an appropriation of six hundred dollars per annum, and it was granted. This sum was regularly paid out of the county treasury until the act of consolidation was passed, when it lapsed. With this, premiums were paid, and no charge of admission was made at the exhibitions. After this, we were obliged to resort to an entrance fee of twenty-five cents. It was in 1839 we first notice the value of imported cattle—in Mr. Dennis Kelly's imported bull, "Prince of Wales," and in Mr. Gowen's cow, "Dairymaid," and in Mr. Paschal Morris' cow, "Alice." These were all Durham Shorthorns. At this period, 1839, my agricultural career commenced, and I can well recall those fine animals, as they were admired by all visitors.

Among the men who were then active in the affairs of the Society were Isaac W. Roberts, Samuel C. Ford, W. S. Torr, Philip Reybold, P. R. Freas, Aaron Clement, Henry Charley, Owen Sheriden, Owen Jones, Isaac Newton, George Uhler, C. W. Harrison, John Lardner, Cornelius S. Smith, Dr. Emerson, Robert T. Potts, John S. Haines, C. B. Rogers, Elias E.

Boudinot, John McGowan, Morris Longstreth, Imanuel Eyre, William Wister, Chalkley Harvey, Dr. Robert Hare, R. Penn Gaskill.

At this time, the Society encouraged the growth of fine crops, and offered liberal premiums for the best five acres of corn, potatoes, sugar beets, turnips. On many occasions I acted as one of the committee. Our visits to the many farms were the source of much pleasure. Especially do I recall the fine crops of roots raised on Mr. James Gowen's farm, at Mt. Airy, and the many prominent men who assembled there to talk on the subject of agriculture.

At the exhibition of 1842, the trial of plows was the main feature of the year. The Dickinson plow, Chestnut Hill, had been in universal use, but on this occasion the Prouty and Mear's self-sharpening plow was introduced and became the favorite with the farmers.

Also, in 1842, the Jersey and Guernsey cattle were first exhibited and classified for the award of premiums under the name of Alderney. Mr. Nicholas Biddle, Dr. Gibson, and Mr. Philip Physick, and Mr. Supplee contended for those premiums, Mr. Biddle taking the greater number. There was no distinction made between the cattle of the two islands, and many crosses were made with the full approval of the greatest admirers of both breeds. This continued for some years, when the great mistake was discovered. The establishment of the herd-book remedied this defect, but most of the breeders had great difficulty in registering their cattle, having mixed the blood of the two islands.

At this period of the Society's history, the annual address was always an object of interest. Distinguished men were selected. In 1842, Mr. Peter A. Brown was the orator. He dwelt much on the raising of sheep. Those interested in this branch of husbandry would do well to read this address.

In 1844, Mr. Nicholas Biddle declined reëlection, and Dr. James Mease was chosen President; Mr. Kenderton Smith, Vice President; Mr. Aaron Clement, Secretary; and, in the following year, 1845, Mr. George Blight succeeded Mr. Algernon S. Roberts as Treasurer; which office he still holds—a period of forty years.

At this time, the use of guano was introduced, and the mode of its application to plants was but little understood. Well do I recollect how my entire crop of corn was destroyed by a too liberal supply of this fertilizer, the germ being burnt off by the heat of fermentation.

In 1846, Mr. James Gowen, ever a great patron of agriculture, was desirous of establishing an agricultural school to educate young men to be *practical* farmers. This was accomplished in 1847 by leasing to Mr. John Wilkinson his farm at Mt. Airy, Germantown, who carried on this school for some years. This Society gave Mr. Wilkinson what encouragement it could, but finally he was obliged to abandon the project.

In 1846, the Society allowed Mr. John S. Skinner the free use of their rooms for the publication of the *Plough, Loom, and the Anvil.* It advocated how mutually allied those three great interests are, and it had a large circulation.

At this period the, Society was in its most flourishing condition. The meetings were largely attended. At times thirty were present, all desirous to promote the cause we had at heart. The potato disease then first troubled the farmer. This was thoroughly investigated, but no especial conclusions were reached. The proper season for cutting timber occupied our attention. Much correspondence took place with those most experienced, and the conclusion arrived at was that wood cut during the months of February and August was the most durable. Lectures on chemistry were delivered by Professor Johnson, and members of this Society attended.

In this and many other ways the Society showed its activity, and at each meeting new members were elected. Exhibitions were annually held, each developing some new feature in the improvement of stock and implements. These were held at the above-mentioned places.

Members who became active at this time, not heretofore mentioned, were: Mr. John Wilkinson, Gen. Geo. Cadwalader, Dr. James McCrea, Samuel Cooper, James and Adrian Cornell, of Bucks county; James S. Huber, Gustavus Engle, A. M. Spangler, Dr. Alfred L. Kennedy, Mr. Harry Ingersoll, Mr. Charles Fox, Mr. Dennis Kelly, and Mr. Alexander Scott.

In 1847, the Farmers' Club was organized as auxiliary to this Society. To do this more effectually, monthly visits to each other's farms were made. The stock was examined, and a general inspection of the crops was made. The original members of this club were: Mr. David Landreth, Dr. Alfred Elwyn, Mr. James Gowen, Mr. George Blight, Mr. Philip R. Freas, Mr. Owen Sheridan, Mr. J. S. Huber, Mr. Charles W. Harrison, Mr. Samuel C. Ford, Mr. Casper Sharpless, Mr. John S. Haines, and Mr. Harry Ingersoll. In the following year, Gen. R. Patterson and Mr. McMichael were elected. This club still exists, but has become a social organization.

In 1849, a German by the name of Nefflin was introduced to the Society at one of the regular meetings. He claimed to have a perfect knowledge of the cow, and to be able to distinguish her character; whether she be a milker or no. This he called "the Guinon system of judging cows." His theory was entirely new, and we all had misgivings as to the correctness of his powers of judging. A committee was appointed to visit with him the dairies in the neighborhood of the city, and it was surprising with what accuracy he portrayed the character of every cow, to the great astonishment of her owner. It was my good fortune to form one of the committee, and I have been a firm believer in the theories of Monsieur Guinon ever since. The appointment of a commission by Governor Hartranft to investigate the truth of the theory, and the report it made, has done much to establish the correctness of this system.

In 1853-4, the properties on which the exhibitions were held changed ownership. Streets were opened and many city improvements so altered their character that we were obliged to seek other locations. In 1854, the Pennsylvania State Agricultural Society was desirous of holding their exhibition in Philadelphia. They made application to the Pennsylvania railroad for the vacant lot of ground now comprehended in the space from Powelton avenue station to the river Schuylkill, and Market street and Callowhill street bridges. Their request was granted, and a fine show was held, being very profitable to the Society. In 1855, this large area, well graded, was still unoccupied by the same railroad, and its use was again obtained for an exhibition to be held by this Society. To follow in the wake of the State Society was considered a bold act, which required great energy to perfect. The members were equal to the task, the citizens responded to our demands, and the officers of the Society opened to the public an exhibition equal to the one of the previous year, and in some respects more attractive, especially in the exhibit of implements and produce. Nothing up to that period had exceeded the display of implements made by Mr. Landreth, and C. B. Rogers, and others. At this period the trotting course was considered a very important feature of an exhibition. It was so in this case; some celebrated horses were exhibited, and attracted crowds. It was kept open from the 11th to the 14th of September, the weather was fine, and the success was beyond our expectations. This was a memorable fair, and the last ever held by this Society. In 1856, the United

States Agricultural Society held its second exhibition on these grounds, and in the following year they were required for railroad purposes.

During this year, 1855, the rooms of the Society were changed. In December, we removed to No. 166 Chestnut street, near Seventh, in the Fisher buildings, second story, south. The meetings continued to be well attended, notwithstanding we were prevented from holding exhibitions. These new rooms, being adjacent to the hotels on Market street, where many of the " market " farmers " put up," it was desirable to open them on Friday evenings for their convenience, but this good purpose failed—the farmers could not see the advantages it offered. The most conspicuous event of 1856 was the celebration of its seventy-first anniversary by a grand dinner given on the 11th of February at the Sansom Street Hall, which was tastefully decorated with flags and agricultural devices. Mr. Landreth, then President of the Society, took the head of the table, Mr. Anthony Newbold and Mr. Aaron Clement, on each side as Vice-Presidents. Dr. A. L. Kennedy was then Secretary. Circumstances prevented your Treasurer from being present. General R. Patterson, Judge Conrad (then mayor) and Mr. W. Meredith were among the invited guests. Mr. Landreth delivered a very interesting address, which was frequently interrupted by applause. This was a memorable occasion in the history of the Society.

After the year 1860, interest in the affairs of the Society began to diminish. In the adjoining counties, the agricultural societies became more influential and drew away many of our active members. The public mind was then much excited by the political events of the day, which culminated in the Civil War in 1861. Meetings, however, were held, and a few most interested would attend, but all active operations were suspended. On the seventy-fifth anniversary, a large attendance was secured. Notice had been given that Mr., now Judge, Craig Biddle, would read a paper on the transactions of the Society. This was a most satisfactory article, and gave great pleasure to all the members present. There are many who are familiar with the condition of the Society for the last twenty-years. A few of the members still adhered to the old parent Society, and the minutes will show that the meetings have been more or less regularly held. At these meetings subjects prominent in agriculture of the day were discussed, such as the substitution of creameries for the manufacture of butter, and new invention of the separator, as well as the introduction of greatly improved breeds of cattle. It is my fervent wish that this influence, though silent, may still continue to promote the noble cause of agriculture.

Presidents of the Society.

1785—Samuel Powell, Esq.
1806—Richard Peters, Esq.
1820—Richard Peters, Esq.
1838—Nicholas Biddle, Esq.
1845—Dr. James Mease.
Algeron S. Roberts, Esq.
James Gowen, Esq.
Dr. Alfred L. Elwyn.
David Landreth, Esq.
Aaron Clement, Esq.
Craig Biddle, Esq.
Wm. H. Drayton, Esq.
1885—Dr. Chas. R. King.

The different localities where the Society held its meetings were as follows: February, 1785, Byrnes' tavern, Sign of the Cock; June, 1785, removed to Carpenters' Hall; April, 1805, the City Coffee House was temporarily used; in June, 1805, permanent arrangements were made with the Philosophical Society to pay one half the rent of their hall, Fifth street, below Chestnut; in 1842, the Society removed to Washington Hall, South Third street, adjoining Head's hotel. It was during the occupancy of these rooms that the Society attained its utmost activity. In 1855, the rooms of the Society were removed to the Fisher buildings, Chestnut street below Seventh, and in 1862 to the south-west corner of Ninth and Walnut streets, and again, in 1874, to No. 244 South Third street, the present locality.

On motion of Hon. Craig Biddle, the thanks of the Society were returned to Mr. Blight for his satisfactory paper, and a copy of the address was requested for publication.

Mr. Burnet Landreth read an interesting paper, giving the early history of agricultural societies.

The thanks of the Society were returned to Mr. Landreth, and a motion prevailed that the document be published in connection with Mr. Blight's paper.

On motion, Mr. Blight's paper was directed to be entered on the minutes.

HISTORICAL NOTICE OF OTHER EARLY AGRICULTURAL SOCIETIES.

By BURNET LANDRETH,

One of the Vice Presidents of the Philadelphia Society for Promoting Agriculture.

Mr. President and Members:

To-day we meet to celebrate the centennial of the birth of the Philadelphia Society for the Promotion of Agriculture—a notable event, as one hundred years is a long time in this country of transient things for any society of such character to continue in existence, and especially interesting as it commemorates the founding of the first agricultural society organized in the western world—a society which became the fertile mother of all other agricultural societies since established in America.

As an addendum to the history of this ancient and honorable society as just read by Mr. Blight, it may not be out of place, certainly will be of some interest, to refer to the establishment of similar organizations for the advancement of agriculture preceding its organization and immediately following, and to the condition of development of agriculture at those periods.

Under the expansion of the human mind succeeding the opening of the last century, producing a general advance in all things material, agriculture rose to a higher plane—reason, rather than habit. beginning to guide in the culture of the soil and in the administration of the farm. As an advance in the system and theory of husbandry offered an inducement to a more intelligent class to embark in farming. the results of which took expression in more tidy farms, improved stocks of seed and domestic animals, a more complete organization, and more profitable results. Societies for mutual improvement next followed, and farm schools in their order, till now the reading farmer finds it impossible to wade through the essays, reports, transactions, and records of experiments issued from every press.

The avocation of the farmer of to-day, if he be a progressive man, is scientific in the treatment of soils, in the developments of new forms of grains, bulbs, and roots, by selection and processes of hybridization, in the perfection, by selection and breeding, of the most desirable qualities of domestic animals for the production of the heaviest carcasses of meat, most profitable forms of fiber, in the development of milk, of speed, and of power. The intelligent farmer must be a mechanic, as the machinery of the present day is complex and expensive. He must be a good merchant, to dispose of his products in the best markets, and at the most profitable moment.

Let us review some of the forces which have done so much to bring about these striking advances in husbandry.

The first agricultural society of which there is any record was founded in the north of Italy, about 1705, but it lasted only a few years.

Southern Europe was also first in systematic agricultural education, a farm school having been founded at Hojwye, in Switzerland, in 1706. It is claimed that three thousand peasants were instructed in the higher systems of farming during a period of thirty years following, but, no doubt, the teaching was, to a large extent, fallacious, as the theories of Virgil were not yet exploded. Nothing was known of vegetable nutrition, nothing of vegetable physiology ; little was known of botanical science ; Linnæus was an infant.

The second scholastic effort at agricultural education was the foundation of a professorship of agriculture at Edinburgh, in 1790.

To return more directly to the formation of agricultural societies, we find that the Scotch next appeared as exponents for a higher farm education, founding, in 1723, a " Society of Improvers in the Knowledge of Agriculture for Scotland." This existed only a few years, but the society was re-organized in 1735, and continued to hold meetings for a brief period thereafter.

In 1731, the Dublin Agricultural Society was founded, under the title of " The Dublin Society for the Improvement of Husbandry." After this, in 1737, was organized the Yorkshire Agricultural Society.

In 1779, the " Bath and West of England Society " was founded. This has since become an organization of great value to the cause of agriculture, ranking only after the " Royal."

The oldest horticultural society in Europe is in Belgium, established in 1780, and, as far as known, the first established in the world.

The " Horticultural Society of London " was founded in 1784, through the efforts of Mr. John Wedgewood and Sir Joseph Banks, the latter of whom replied to an invitation to join, as follows : " I approve very much of the idea. I know of no trade that conceals so many branches of knowledge as that of the gardener, and few subjects where the public would be more benefited by the disclosures which such a society would immediately occasion. I shall be flattered if the gentlemen who are to arrange the plans give me the honor to set me down as an original member." This list of original members numbered sixty. The first volume of transactions was published in 1810, and until 1848 the society poured out copious stores of information, the results of a multitude of important and well-tried experiments. These papers were published in a series of ten volumes, at a total cost of £25,250, or $12,500 for each of the ten series—a sum very far exceeding the subscriptions, though each member received a volume, as published. We have not heard of any American society that has been as liberal as this.

The next agricultural society on record, after the Bath and West of England, is the Highland Society, instituted in 1783, and since chartered as the "Highland and Agricultural Society of Scotland," holding its first meeting in 1784, the year preceding the organization of our own Philadelphia society. This Highland society, upon its organization, received from the Government the sum of £10,000, accruing from the sales of attainted land following the rebellion of 1745. In 1799, it began to publish its transactions. At present its membership exceeds five thousand. To illustrate the scope of this society, and the broad and practical views of its founders, may be mentioned the objects which it designed to advance:

"1. Agricultural meetings, with a general show of stock, implements, farm and dairy produce, to be held in the principal towns of Scotland.

"2. Encouraging a system of district shows for the improvement of breeds of stocks most suitable for the different parts of the country.

"3. The encouragement and promotion of a proper system of agriculture and forestry education.

"4. For the advancement of the veterinary art by conferring the Society's certificate upon students qualified to practice.

"5. The appointment of chemists in the science of agriculture.

"6. The establishment of an agricultural museum.

"7. The publication of reports and prize essays."

In 1791, the State Agricultural Society of New York was founded and continued till 1819, when it was dissolved and a State Board of Agriculture formed. In 1832, the present New York State Agricultural Society was organized.

In 1792, the Massachusetts Society for Promoting Agriculture was established and still exists.

In 1792, the London Veterinary College was founded—the first and ever the foremost. The British Board of Agriculture, the first governmental effort made in Great Britain to advance husbandry, was organized in 1793. It was conceived, developed, and established principally through the exertions of Sir John Sinclair and Arthur Young, and continued active till 1812. It is interesting to note that its character was, to a considerable extent, influenced by the opinions of George Washington, then in intimate correspondence with the gentlemen just named. Sir John Sinclair said of the British Board of Agriculture: "It made farmers residing in different parts of the kingdom acquainted with one another and caused rapid dissemination of knowledge amongst the whole profession. The art of agriculture was brought into fashion, old practices were amended, new ones introduced, and a degree of exertion called forth, heretofore unexampled, among agriculturists in this island."

Washington, writing to the first named upon one occasion upon the subject of the Board, said: "I consider it an institution, of the utility of which I entertained the most favorable idea from the first intimation of it, and the more I have seen and reflected on the plans, the more convinced I am of its importance, in a national point of view, not only to Great Britain, but to all other countries, and am solicitous to protect it from the ignorance or inattention of future ministers, who, incapable of estimating the merits of such an institution themselves, or concerning the advantages that might be derived from it, might heedlessly either diminish the sphere of its utility or terminate its existence."

Again he said, writing of the Board: "I am convinced of its importance in a national point of view, not only to your own country, but to all others which are not too much attached to old and bad habits to forsake them, and to new countries that are just beginning to form systems for the improvement of their husbandry." Washington was made a foreign honorary member to the British Board of Agriculture in 1795. It was dissolved in

1813 in consequence of the withdrawal by the Government of the annual Parliamentary grant, a party measure in which agriculture was a shuttlecock, as Washington had prophetically intimated it might be.

Here, in serial order, another American society entered the field, the South Carolina Agricultural Society, being incorporated in 1795. It did much to improve processes and still exists in unbroken line.

Next after this, in 1798, the Smithfield Club, of London, was organized, since famous for its cattle shows.

The Society of Horticulture of Paris was founded in 1826, "for perfecting the art of gardening, for simplifying the method, for facilitating study and processes." It held its first exhibition in 1834.

Closely following, was founded the Pennsylvania Horticultural Society, on June 2, 1828, being the first society of the kind organized in America. Like its mother, the Pennsylvania Society for the Promotion of Agriculture, it became in turn the mother of numerous horticultural organizations throughout the Union for the advancement of rural education, taste, and comfort. Philadelphia has thus the high honor of being the birth-place of organized horticulture, as well as agriculture, and her citizens yet retain their ancient prestige as patrons of these arts.

The first officers of the Pennsylvania Horticultural Society were: Horace Binney, President; James Mease, Vice President; Matthew Carey, Vice President; David Landreth, Vice President; N. Chapman, Vice President; Samuel Hazard, Corresponding Secretary; William Davidson, Treasurer; David S. Brown, Recording Secretary.

The Royal Agricultural Society of England was established in 1838, with four hundred members, now increased to over six thousand. It is now the leading agricultural society in the world.

The Royal Agricultural Society of Ireland was founded three years after its English namesake.

Thus, it appears, the eighteenth century may be termed the renaissance or new birth of agriculture, little attention being paid preceding that era to the systematic cultivation of the soil; herding, with its freedom of movement, being preferred to the toil of tillage. A more settled state of political conditions made it possible for the owners of land to improve them and give personal attention to their management, though pursuing systems radically wrong judged in the light of the science of the present day.

Jethron Tull, in 1731, published his famous book, notable for vigor in the assertion of systems, some of which were soon proved fallacious, but containing many truisms, far in advance of his day and generation. His scathing criticism of the so-called "Virgilian Husbandry of England" was well deserved and bore admirable results. Tull was the first in England to drill wheat in modern days. History records in very early days the use of appliances for the mechanical distribution of seed, but no machine of practical value is known to have been used until Tull invented his wheat drill in 1733, and his turnip drill seven years thereafter; both being upon the principle of revolving cylinders fitted with changeable cavities for the reception of variable quantities of seed.

Turnip culture was introduced during this era, being first pursued in Norfolk, England, as early as 1750, and introduced into Scotland about 1770; growing there to gigantic proportions by reason of favorable soil and climate influences, and the keen business insight of the Scottish farmers.

Following the culture of turnips, came the growth of the mangel-wurzel, which was introduced about 1786 as a field crop for cattle-feeding purposes. But to show the backward state of agriculture preceding these dates, we may refer to the fact that orchard grass, native to Europe, as well as America, was uncultivated preceding 1764, and, to still further illustrate the undeveloped conditions, cite the astounding statement from the *Edinburg Quarterly Journal of Agriculture,* "that up to 1792, the processes of sowing grass seed were unknown in Scotland." In England more progress had been made, but systematic seeding to grass was not practiced till after the introduction of timothy and orchard grass—now about one hundred years ago.

With cattle, no effort had been made to give them distinct breed characteristics till about 1720, when attention was first practically fixed upon their improvement. Short horns becoming, about 1750, a distinct type, a recognized breed, rapidly growing into favor and assembled in large herds. The Duke of Northumberland, in 1766, was dubbed the "Yorkshire Grazier," so fond was he of his Short horns.

Sheep, at this time, were wonderfully improved through the efforts of Robert Bakewell, 1765 to 1790, his processes of selection on the sheep of Leicester producing such marked improvements as to induce others to develop improved types of other breeds. Bakewell was so successful in his processes of selection that his rams brought him £400 each per annum, a fabulous sum for that day.

Thus it will be seen that just preceding the establishment of our venerable Philadelphia Society, the attention of the land-holders of the Old World was strongly turned to the advancement of agriculture, similar fruit being borne here as soon as the American soldiers were enabled to turn their swords into plowshares.

Philadelphia was a fitting place to organize the first agricultural society; it was the largest and most wealthy city. Surrounded by a country of wonderful fertility, its people had always taken much interest in rural affairs, and a retrospective glance over what had been done here in connection with things pertaining to country life will be worth a moment's time.

As far back as 1728, John Bartram began to make his botanic garden and arboretum, the first in the United States. Some of his old trees still stand in their full majesty to-day. The old house and grounds are worth a pilgrimage by any one who has any reverence for antiquated things and the memory of one of nature's noblemen.

In 1748, Peter Kalm, a pupil of the immortal Linnæus, settled at Philadelphia and did much to extend the range of botanical research. Dr. Adam Kuhn, another pupil of Linnæus, also settled in Philadelphia in 1768, and was the first professor of botany in America. In 1773, the second botanical garden was established a few miles out of Philadelphia, by Humphrey Marshall, and his example was followed by John Jackson, whose plantings, in part, still stand as his monument. In 178[illegible], Humphrey Marshall published at Philadelphia the first American botanical work, one of credit to his attainments and enterprise.

Thus, Philadelphia was, in a marked degree, a nursery of rural tastes, even in colonial days, and later, after the Revolution, and during the early years of this century, and to the present, it still leads in the horticultural beauty of its suburban homes, and in the advanced methods pursued by its graziers, its dairymen, and its grain farmers. It may be interesting to note that those families who, from early days till the present, have retained their wealth and standing have been those who have rigidly held to their ancestral acres.

Among the first of American farmers of that day, stood Washington, who devoted all his leisure time and thought to the improvements of his lands, directing with his eye and hand, and laying out his system of rotation, complete and rigidly adhered to. As before remarked, he was in constant communication with the foremost farmers of the Old World, and on every occasion demonstrated his conviction that upon the farmer depended the wealth and prosperity of the nation. He realized the depressed condition of agriculture in America, saying in a letter to Sir John Sinclair, in 1786: "The system of agriculture, if the epithet of system can be applied to it, which is in use in this part of the United States, is as unproductive to the practitioners as it is ruinous to the landlords. yet it is pertinaciously adhered to. To forsake it, to pursue a course of husbandry which is altogether different and new to the gazing multitude, ever averse to novelty in matters of this sort, and much attached to their old customs, requires resolution, and, without a good practical guide, may be dangerous." In America, up to 1790, there was no rational system of farming pursued, the soil ran down year by year, and, with a few exceptions, everything was done in a slipshod manner.

The introduction of the use of gypsum did much, in fact did everything, to establish new systems with improved results. Its value in America was first demonstrated as a stimulant to the growth of clover, as a recuperative crop, in the neighborhood of Philadelphia, in 1795, by Judge Peters, then President of this Society, who, by his zeal and perseverance, did more than any one else to illustrate its value on light soils, and aid in the establishment of rotation of crops, or convertible husbandry.

Another Philadelphian, though residing in Jersey, a few miles above the city, was the inventor and patentee of the first iron plow, a patent being granted to Charles Newbold, in 1797, for a cast-iron plow, in which the mould-board, share and land-slide were all cast together. This was considered so valuable an invention that it attracted the attention of scientific men, and Jefferson, among others, applied himself to developing a mould embodying principles to lessen draft and friction. He was a strong advocate for mould-boards constructed upon mathematical principles, as appears by his letter of 1798 to the British board of agriculture, and also in a similar report to the institute of France.

About this time, the intelligence of the advanced farmer began to teach him that different plants exhausted the soil in unequal degrees, and in different manners, producing varying after-results. This gave rise to systems in cropping, or the planting of crops in courses most advantageous to the soil, not only resting and cleaning the land, but, in many notable examples, raising it from a degree of moderate fertility to great productiveness, distinct systems being adopted on lands of distinct formations; before that, no difference in culture being made, whether lands were calcareous, sandy, siliceous, or argillaceous. Virgil alludes to the use of limestone ash as a fertilizer, and tradition has it that the early inhabitants of Britain used it also, but it remained for a German, by the name of Meyer, in 1760, to practically and publicly demonstrate its value. The use of gypsum, as a dressing to the grasses, was certainly a long step in advance, and did much to improve the tone of agriculture.

In 1775, we first hear of the use of bone as a fertilizer in England—first entire, then crushed—making another era of progress in the development of agriculture, and like all other good things connected with the history of the improvement of husbandry, requiring perseverance and determination on the part of its advocates.

We are indebted to Washington directly, and to Sir John Sinclair indirectly, for the formation of a United States Department of Agriculture, well conceived, but miserably administered. Sir John Sinclair, September 10, 1796, wrote to Washington as follows: "I hope you will recommend some agricultural establishment on a great scale before you quit the reins of government. By that, I mean a Board of Agriculture, or some similar institution, at Philadelphia, with societies of agriculture in the capital of each State to correspond with it. Such an establishment would soon enable the farmers of America to acquire agricultural knowledge, and, what is of equal importance, afford them the means of communicating what they have learnt to their countrymen."

At the next session of Congress, Washington did recommend a National Board of Agriculture in the following language, under date of December 5, 1796, here again illustrating his breadth of mind and patriotism: "It will not be doubted that, with reference either to individual or national welfare, agriculture is of primary importance. In proportion as nations advance in population and other circumstances of maturity, this truth becomes more apparent and renders the cultivation of the soil more and more an object of public patronage. Institutions for promoting it grow up supported by the public purse; and to what object can it be dedicated with greater propriety. Among the means which have been employed to this end, none have been attended with greater success than the establishment of boards composed of proper characters charged with collecting and diffusing information, and enabled by premiums and small pecuniary aid to encourage and assist a spirit of discovery and improvement. This species of establishment contributes doubly to the increase of improvement by stimulating enterprise and experiment, and by drawing to a common center the results everywhere of individual skill and observation, and spreading them over the whole nation. Experience, accordingly, has shown that they are very cheap instruments of immense national benefits."

We have now a National Agricultural Department, but except as a valuable statistical bureau, which work could be managed by the Department of the Interior, what good does it accomplish in the line of its original conception, with its annual appropriation and expenditure of eight hundred thousand dollars? Its field experiments are entirely secondary to the practical work of several State boards, and its efforts towards the introduction of new plants, fibers, and seed are eclipsed by the work of private individuals, though the broad plains and mountains of our half-developed globe doubtless bear a wealth of valuable plants awaiting the research of enterprise.

The Agricultural Department was founded, originally, for the special purpose of introducing *new varieties* of valuable plants, but how sadly it falls short of this important duty! Considering the age, considering the advancement of agricultural intelligence, considering the opportunities at command of the United States Department of Agriculture, most prominent among which may be named its official connection with our ministers and consuls the world over, and the courteous attention which would be given to its representatives or requests by every ruler, great or small, what has it done? Next to nothing. What has it done in the way of introduction of valuable newly-discovered native or foreign forms, of fruits, of esculents, of fibers, of cereals, of oleaginous plants, of saccharine plants? It certainly does not advance these interests as designed by those active in its incorporation.

With this somewhat disjointed review of the history of agricultural societies, and imperfect references to the contemporaneous development of agriculture, I will close with the remark, that not only did our society lead in the New World, but was almost as early established as those of the Old World, and is to-day, with three or four exceptions, the senior of any in Europe.

VIII. CONSTITUTION

OF THE

PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

The name of the Society shall be the PENNSYLVANIA STATE AGRICULTURAL SOCIETY. The objects of this Society are to foster and improve agriculture, horticulture, and the domestic and household arts.

Who are Members.

SECTION 1. The Society shall consist of all such persons as shall pay to the Treasurer not less than two dollars, and annually, thereafter, not less than two dollars; and also, of honorary and corresponding members, the names of the members to be recorded by the Secretary.

The officers of county agricultural societies in this State, or delegations therefrom, shall be members *ex-officio* of this Society.

The payment of fifty dollars shall constitute life membership, and exempt the members so contributing from all annual payments.

Officers.

SECTION 2. The officers of this Society shall be a President, Vice President from each congressional district, three fourths of whom shall be practical agriculturists or horticulturists, a Treasurer, a Corresponding Secretary, a Recording Secretary, a Librarian, an Agricultural Chemist and Geologist, and such assistants as the Society may find essential to the transaction of its business; an Executive Committee, consisting of the above-named officers, five additional members, with the ex-Presidents of the Society.

Of the President.

SECTION 3. The President shall have a general superintendence of all the affairs of the Society. In case of the death, illness, or inability of the President to perform the duties of his office, the Executive Committee shall select a Vice President to act in his stead, who shall have the same power to perform the same duties as the President, until the next annual meeting.

In case of the death or resignation of any of the officers of the Society, the President shall have power to fill the vacancy by appointment until the next annual election.

Ex-Presidents.

That whenever the number of ex-Presidents exceeds five (5), the name receiving the lowest number of votes shall be the one dropped from the list of officers.

Of the Vice Presidents.

It shall be the duty of the Vice Presidents to take charge of the affairs of the association in their several districts; to advance all its objects; to call upon farmers to report as to the condition of agriculture in their neighborhood; to ask for information as to the modes of cultivation adopted by different farmers; and, as far as in their power, to make known the resources of their districts, the nature of its soil, its geological character, and all such matter as may interest farmers in every part of the State.

That at the annual elections of this Society there shall be elected from one of the number of Vice Presidents, one of said officers to act as first Vice President, whose duty shall be to act as President of this Society in case of absence or death of the President.

Treasurer.

The Treasurer shall keep an account of all moneys paid into his hands, and shall pay bills when audited and approved by the Executive Committee. Each order for payment must be signed by the President or chairman of the Executive Committee.

Corresponding Secretary.

The duty of this officer shall be to invite a correspondence with all persons interested in agriculture, whether in the State of Pennsylvania or elsewhere, but especially with our consuls in foreign countries, that new seeds, vegetables, or live stock may be introduced, and their fitness for cultivation and propagation in our climate be tested. At each stated meeting of the Society, he shall read his correspondence, which shall, either the whole, or such parts as may be selected by the Society, form a portion of the transactions. He shall also correspond with the President or other officers of each State society in the United States, at least twice in the year, for the purposes of combined and mutual action, and to be informed of the results and progress of each other's efforts: also to invite mechanics to forward models or implements for examination or trial.

Recording Secretary.

The Recording Secretary shall keep the minutes of the Society and of the Executive Committee. At the close of each year, he shall prepare for publication such parts of the minutes and transactions of the Society as may be designated.

The Recording Secretary shall have power to approve such bills and contracts as he is authorized to make, and the Treasurer shall pay the same.

Librarian.

The Librarian shall take charge of all books, pamphlets, &c., belonging to the Society, and shall act as curator to preserve seeds, implements, or whatever property the Society may possess.

Executive Committee and Quorum.

The Executive Committee shall transact the business of the Society generally; shall superintend and direct the publication of such of the reports and transactions as they may deem proper, and shall designate the time and places for annual exhibitions, regulate the expenditures, examine all accounts, and keep such general charge of the affairs of the Society as may best promote its interests.

They shall select their own chairman, and meet quarterly, and at any other time when convened by the President; five members shall form a quorum.

They shall call special meetings of the Society when necessary.

Annual Meeting of the Society and Quorum.

SECTION 4. The Society shall meet annually, on the third Wednesday of January, at Harrisburg, when all the officers of the Society, not otherwise appointed, shall be elected by ballot for the ensuing year, and until another election. They shall also hold a general meeting at the time of the annual exhibitions, and special meetings whenever convoked by the Executive Committee.

Fifteen members shall form a quorum for the transaction of business, but no member in arrears shall be entitled to the privileges of the Society.

Qualifications of Voters.

SECTION 5. No annual member hereafter shall be entitled to vote for the election of officers of the Pennsylvania State Agricultural Society unless he shall have been a member of the previous State fair, and in default of a State fair, then three months' previous membership shall be necessary.

SECTION 6. No one shall be eligible to office hereafter who has not obtained a right to vote under section five.

Alterations.

SECTION 7. This constitution may be altered or amended at the annual meetings in January, by a vote of two thirds of the members in attendance.

All amendments to the constitution, to be voted upon at the annual meeting of the Society in January, must be submitted to the meeting of the Executive Committee in September preceding said annual meeting.

LIFE MEMBERS.

1885.

Anspach, J., Jr., Philadelphia.
Armstrong, James, Williamsport.
Allen, Robert P., do.
Andrus, D. S., do.
Allen, Charles, do.
Armstrong, William H., do.
Allen, John H., Montourstown.
Ayres, J. J. Williamsport.
Andrews, E., do.
Allen, William H., Agricultural College.
Armstrong, W. H., Easton.
Ashbridge, E. B., Willistown Inn P. O.
Allen, John E., Middletown.
Alricks, William K., Harrisburg.
Allen, John F., do.
Anderson, James, Hogestown.
Archer, W. L., Burgettstown.
Adney, W. H. G., Washington.
Bucher, G. H., Hogestown, Cumb. co.
Biddle, Craig, Philadelphia.
Boal, George, Boalsburg.
Bryson, Robert, Carlisle.
Brock, William Penn, Philadelphia.
Brown, George H., do.
Bolden, George, do.
Bard, Edwin Milford, do.
Burnside, James, Bellefonte.
Benson, G. S., Philadelphia.
Bradford, Vincent L., do.
Billings, James B., do.
Baker, Elias, Altoona.
Brautigam, Daniel, Northumberland.
Brown, Jacob B., Columbia.
Bell, Samuel, Reading.
Bell, William, Mifflin.
Bennett, James, Pittsburgh.
Beck, John B., Williamsport.
Bowman, Samuel, Wilkes-Barre.
Breeze, N. W., Wyoming.
Barto, Tobias, Reading.
Bercaw, Abraham, Easton.
Berkenbine, Samuel, Northumberland.
Blair, Horace H., Williamsport.
Beard, Henry, do.
Beck, Samuel M., do.
Brown, James V., do.
Brown, Jacob, Newberry.
Berry, John J., Williamsport.
Bush, D. G., Bellefonte.
Butt, Charles H., Williamsport.
Bender, George H., Easton.
Blight, George, Germantown.
Boyd, T. S., Easton.
Brady, George, Sharpsburg.
Bergner, George, Harrisburg.
Bissel, William S., Pittsburgh.
Bittenbender, Stephen, Shamokin.
Brown, G. W., M. D., Port Carbon.
Boyd, S. T., Easton.
Boas, C. A., Harrisburg.
Bates, Abram, "
Bigler, Samuel S., Harrisburg.
Bomberger, Jacob C., do.
Boyer, W. W., do.
Briggs, John H., do.
Boas, D. D., do.
Bird, Joseph, Northumberland
Buehler, Charles, Harrisburg.
Barr, W., Dr., do.
Bailey, Charles L., Pottstown.
Brown, James C., New Greenville.
Bound, David T., Kingston.
Branson, D. H., Coatesville.
Baldwin, W. A., Williamsport.
Brown, ——, Titusville.
Baker, J. B., Thorndale, Chester co.
Baker, J. B., Jr., do. do.
Boyd, J. F., Chambersburg.
Bergner, C. H., Harrisburg.
Barbour, J. B., Pittsburgh.
Beaver, James A., Bellefonte.
Boyer, George W., West Fairview.
Bush, L. L., Newtown.
Banker, D. and J., Franklin Forks, Susquehanna co.
Cameron, Simon, Middletown.
Curwen, John, Harrisburg.
Chambers, Andrew, Philadelphia.
Christian, S. J., do.
Campbell, Hugh, do.
Campbell, James R., do.
Colkit, C., do.
Craig, Hugh, do.
Carpenter, George W., Jr., Germantown.
Campbell, Thompson, San Francisco, California.
Cassidy, Joseph A., Philadelphia.
Clark, Edward S., do.
Carmalt, S., Friendsville, Susquehanna co.
Carlisle, Robert M., Philadelphia.
Campbell, Wm. S., do.
Cowden, J. B., Northumberland.
Chess, Moses, Temperanceville.
Corson, George N., Norristown.

Cake, Joseph W., Northumberland.
Calder, James, Rev.. Harrisburg.
Clymer, Hiester, Reading.
Conner, Joseph P., Fowlersburg.
Crans, Samuel M., Williamsport.
Campbell, John R., do.
Clark, James, do.
Clay, M. L., do.
Coleman, Fletcher, do.
Canfield, Ezra. do.
Campbell, E. B., Jersey Shore.
Cummings, R. D., Bellefonte.
Clayton, William, Pine Grove.
Cramer, Jacob, Uniontown.
Carter, William N.. Jersey Shore.
Coryell, John B., Williamsport.
Crawford, A. S., do.
Colton, Henry, do.
Coder, N. B.. do.
Comfort, J. C., Shiremanstown.
Cumings, A. Boyd, Philadelphia.
Capron, E. W., Williamsport.
Calvin, Otis P., New York city, 234 Broadway.
Carpenter, E. P., Pittsburgh.
Charles, J. S., do.
Cluly, William, do.
Coburn, J. P.. Aaronsburg, Centre county.
Crawford, M. H.. Philadelphia.
Child, S. S., Harrisburg.
Cummings, Charles, Harrisburg.
Colestock, Jacob M., do.
Colestock, Samuel J., do.
Cassell, Jacob, do.
Crisswell, J. Vance, do.
Coover, John B., Mechanicsburg.
Cameron, J. D., Harrisburg.
Chrisman, R. R., do.
Callahan, George. Philadelphia.
Connelly, John, Hyde Park.
Cassatt, A. J., Philadelphia.
Crawford. Albert. do.
Clarke, James. Harrisburg.
Culver, W. B., Scranton.
Clopper, F. Y., Greensburg, Westmoreland county.
Darlington, J. Lacy, West Chester.
Davis, Atlee G., Philadelphia.
Dettry, Henry F., do.
Dickey, E. V., Oxford.
Durar, Enoch, Philadelphia.
Dallett, John, do.
Devereux, John, do.
Devereux, James, do.
Deal. Daniel, do.
Dasher, David, Harrisburg.
Drinker, H.. Montrose.
Driesbach, Daniel G., Beach Haven.
Davis, William L., Easton.
Dœbler, V. S., Williamsport.
Dunlap, H. E., Newberry.
Davis, John L., do.
Du Bois, John, Williamsport.
Datesman, Robert, Milton.
De Haven, Jehu, Harrisburg.
Dempster, Robert, Philipsburg, New Jersey.
Duncan. J. L., M. D., Pittsburgh.
Demees, John, Shamokin.
Darlington, H.. Pittsburgh.
Davis. Joseph H.. do.
Doyle, James B., Philadelphia.
Downing. Thos. H., Philadelphia.
Dull, J. J., Harrisburg.
Dougherty, James D., Harrisburg.
Dougherty, Daniel, do.
Deitz, George A., Chambersburg.
Du Barry, J. N., Harrisburg.
Dillingham, J. B., West Chester.
Davis, E. W., Philadelphia.
Diehl, J. E., Beverly, New Jersey.
Dykeman, G. R., Shippensburg.
Dickey. Samuel, Oxford, Chester county.
Eli, Richard E., Philadelphia.
Evans, David, do.
Ellis, William. do.
Evans, John, York.
Elwyn. A. L.. Philadelphia.
Eby, Jacob R.. Harrisburg.
Eichbaum William, Pittsburgh.
Eberly, Christian, Eberly's Mills.
Everhart, J. T., Pittston.
Engle. Charles K., Bustleton.
Ellis, B. Morris, Hughesville.
Early, Martin, Palmyra.
Eddy, George W., Philadelphia.
Ensworth, L. A., Williamsport.
Eves, George S., do.
Embick. Frederick E., do.
Eldred, Charles D., do.
Elder, Mathias, do.
Edwards, Charles, do.
Elliot, William G., do.
Eveland, S. D., do.
Evender. Thomas, do.
Eppes, William J., do.
Elser, D. B., do.
Eckert, Isaac, Reading.
Evans, Robert, Erie.
Ever, Andrew. Muncy.
Elder, James, (Swatara,) Harrisburg.
Elliott, B. A., Pittsburgh.
Elliott, W. R., do.
Estep, J. P., do.
Etter, B. F., Harrisburg.
Emminger, John, Hogestown.
Early, D. S., Hummelstown.
Egle, W. H., M. D., Harrisburg.
Ensminger. J. T., do.
Emminger. W. H., do.
Edwards, Oliver, do.
Englebert, A. F., Wiconisco.
Fager, George C., Harrisburg.
Fertig, John, Titusville.
Freas, P. R., Germantown.
Frantz, Jacob, Mount Hope, Lancaster county.
Fotterall. Stephen G., Philadelphia.
Foster, Frank T., do.
Failes, George, do.
Flenniken, J. C., Waynesburg, Green co.
Felton, S. M., Philadelphia.
Fulton, Andrew, Pittsburgh.

Fleming, Robert, Williamsport.
Fesler, Philip, do.
Foresman, Robert M., do.
Fisher, John S., do.
Foresman, D. W., do.
Foresman, John, do.
Foresman, Daniel F., Slifer, Union county.
Foresman, R. S., Williamsport.
Fuller, J. W., Montoursville.
Farrell, John, Pittsburgh.
Fass, G., Allegheny city.
Frisch, B., Harrisburg.
Fisler, J. E., do.
Fisler, Amos, Harrisburg.
Fleming, Dr. Jas., do.
Flickinger, Sam'l, do.
Fisher, John R., do.
Fox, Richard, Hummelstown.
Feeman, Valentine, Harrisburg.
Fellowes, J. Turbey, Scranton.
Fiske, A. R., Harrisburg.
Farnum, J. E., Philadelphia.
Filler, John H., Harrisburg.
Grout, H. T., Philadelphia.
Grigg, John Warner, Philadelphia.
Glass, Alex. F., do.
Garber, Jacob B., Columbia.
Gillespie, James, Philadelphia.
Gould, J. E., do.
Gross, Daniel W., Harrisburg
Gilbert, Henry, do.
Gardner, Jacob, Pittsburgh.
Goe, John S., Brownsville.
Goe, John S., junior, Brownsville.
Gould, Stephen, Williamsport.
Gould, John, Luzerne county.
Gehr, D. O., Chambersburg.
Garis, David, Easton.
Gilmore, Joseph, Williamsport.
Grier, James, Newberry.
Gibson, C. E., Williamsport.
Gould, Robert S., do.
Gibson, John, do.
Garman, Samuel, do.
Gould, Alexander S., Hickory Run, Lycoming county.
Gregg, Theodore, Bellefonte.
Guernsey, H. A., Philadelphia.
Gaynor, Edward J., Easton.
Greenawalt, Alexander, Allegheny City.
Glenn, John McDonald, Pittsburgh.
Gleen, Robert W., Noblestown.
Grove, M. M., Harrisburg.
Gohl, A., do.
Garman, John, Hyde Park.
Griffin, Henry, Scranton.
Germyn, John, Rushdale.
Gibbs, J. W., M. D., Hyde Park.
Gregory, J. W., Scranton.
Griest, Charles W., York Sulphur Springs.
Gowen, F. B., Philadelphia.
Glatz, A. Hiestand, York.
Haldeman, Jacob S., New Market.
Hiester, A. O., Harrisburg.
Hutchinson, S. Pemberton, Philadelphia.
Hickok, W. O., Harrisburg.
Hacker, William, Philadelphia.
Harvey, Chalkey, Chadd's Ford.
Hazeltine, John, Philadelphia.
Hoopes, Thomas P., Philadelphia.
Hamilton, A. Boyd, Harrisburg.
Hoffman, H. W., do.
Haldeman, Jacob M., do.
Haddock, D., junior, Philadelphia.
Hall, George E., do.
Hiester, F. A. M., Reading.
Hæhnlen, Frederick P., Harrisburg.
Hoffer, John, do.
Hamilton, Hays, Huntingdon Furnace.
Hicks, James, Pittston.
Hutchins, Thomas, Wyoming.
Harvey, E. P., Wilkes Barree.
Hollenback, George M., Wilkes-Barre.
Hitner, Henry S., Barren Hill.
Holstein, William H., Bridgeport.
Hartrenft, Samuel E., Norristown.
Hæhnlen, Jacob, Harrisburg.
Hacket, J. M., Easton.
Hetrick, Josiah P., Easton.
Hutter, William H., do.
Hartman, John, Williamsport.
Hartman, Mathias, Catawissa.
Hagerman, Augustus H., Williamsport.
Herdic, Peter, do.
Hill, Theodore, do.
Hall, John B., do.
Hudson, Joseph E., do.
Heidler, David, do.
Holden, H. L., do.
Hays, J. W., do.
Huling, G., do.
Hinkle, John R., Newberry.
Higgins, William C., Williamsport.
Huyck, George, Newberry.
Hull, Joseph F., Hull's Mill.
Hepburn, Andrew, Williamsport.
Harrington, Thomas L., do.
Heylmun, E. G., Crescent, Lycoming co.
Howell, A. Williamsport.
Howland, Rausford, Williamsport.
Hastings, H. S., do.
Holliday, B. B., Wellsboro'.
Hepburn, John, Williamsport.
Hagy, Philip, do.
Hull, W. R., Cogan Station.
Hise, Adam, Williamsport.
Herriot, W. A., Oakdale, Allegheny, co.
Hamilton, Cyrus E., Williamsport.
Hoffman, Philip, do.
Hester, Joseph M., Easton.
Helick, Reuben, do.
Higgins, William V., Williamsport.
Hemmingway, E. E., Easton.
Hugus, P., Pittsburgh.
Hale, James P., Oceola, Clearfield county.
Higgins, William V., Williamsport.
Herr, Henry, Harrisburg.
Hummel, Richard H., do.
Hummel, William, do.
Hickman, Amos S., Monticello, Illinois.
Hynicka, George, Harrisburg.
Hummel, S. A., do.

Hæhnlen, William, Harrisburg.
Hamilton, Hugh, do.
Hargest, William F., do.
Hostic, John, do.
Herr, D. S., do.
Hummel, Alfred, do.
Hall, John W., do.
Heck, Lewis, M. D., Dauphin.
Hamilton, T. A., Harrisburg.
Hain, George, Lower Paxton, Dauphin co.
Hoffman, H. B., Millersburg,
Hunter, George W., Harrisburg.
Hutchison, J. W., do.
Hildrup, W. T., do.
Halstead, N., Scranton.
Hill, J. F., do.
Hallstead, W. F., do.
Hinckley, Isaac, Philadelphia.
Herman, John C., Harrisburg.
Ingersoll, Harry, Philadelphia.
Irwin, James, Philadelphia.
Innis, John A., Easton.
Jenison, E. P., Philadelphia.
Jordan, John, Philadelphia.
Jefford, A. H. Wyoming.
Jenkins, G. S., do.
Jenkins, Steuben, do.
Jones, Daniel, Exeter, Luzerne county.
Jessup, William H., Wilkes-Barre.
Jackson, George D., Dushore, Sullivan county.
Johnston, William, Easton.
Jones,John E., Williamsport.
Jarrett, John, Hepburn, Lycoming county.
Jones, Samuel, Williamsport.
Jamison, Edward, Newberry.
Jamison, L., Williamsport.
Jeter, Tinsley, Bethlehem.
Jones, B. F., Pittsburgh.
Jordan, Thomas J., Harrisburg.
Jones, W. H., Philadelphia.
Kennedy, A. L., M. D., Philadelpnia.
Kapp, Amos E., Northumberland.
Kramer, Philip, Philadelphia.
Knight, W. H., do.
Kimbal, Stephen, do.
Knight, Edward C., do.
Keller, John S., Orwigsburg.
Kunkle, Benjamin S., Harrisburg.
Knapp, D. B., Williamsport.
King, C. M., White Deer Mills, Centre county.
Kinyon, S. C., Williamsport.
Kinsman, William H., Easton.
King, Alexander, Pittsburgh.
Kreybill, Jacob E., Marietta.
Knipe, Joseph F., Harrisburg.
Koller, Henry M., do.
Kuhn, William do.
Keely, Jerome, Union Deposit, Dauphin county.
Kirby, William C., Harrisburg.
Kopple, John, do.
Kirkpatrick, John D., North Liberty, Mercer county.
Kelker, Immanuel, Harrisburg.
Keim, George deB., Philadelphia.
Kinny, L., Philadelphia.
Kennedy, Thomas B., Chambersburg.
Kimball, J. M., Erie.
Lukenbaugh, Charles Augustus, Bethlehem.
Longstreth, John, Bristol.
Lauman, George M., Harrisburg.
Languerrene, P. L., Philadelphia.
Linn, Philip, Harrisburg.
Lafrance, Isaac T., Wyoming.
Lee, Washington, Jr., Wilkes Barre.
Leacock, J. R., Wyoming.
Longaker, A. Brower, Norristown.
Line, J. M., Allentown.
Lawall, Edward, Easton.
Lerch, Frederick, do.
Logan, Millard F., Williamsport.
Lown, Elias E., do.
Love, Samuel, do.
Lyon, Thomas, do.
Lippincott, Edward, do.
Lentz, George W., do.
Lehman, M., do.
Levan, E., M. D., do.
Long, Henry B., Pittsburgh.
Long, W. J., Osceola, Clearfield county.
Lamberton, Robert A., Harrisburg.
Lauer, Frederick W., Reading.
Lemon, John A., Hollidaysburg.
Lafferty, Charles, Philadelphia.
Marvin, Selden, Erie.
Marshall, William, Bellefonte.
Meredith, James M., West Chester.
McKinley, Isaac G., Harrisburg.
Miles, James, Girard, Erie county.
McIlwaine, Abram R., Brandywine Manor, Chester county.
Murdock, John, Jr., Pittsburgh.
Mellor, Thomas, Philadelphia.
Mellon, Thomas, do.
Magee, James, do.
McCully, Francis G., do.
McKean, H. P., do.
McKean, Samuel M., Williamsport.
Martin, George H., Philadelphia.
McCrea, William H., do.
McIntyre, Peter, York.
McFarland, John, Ligonier.
Middleton, E. P., Philadelphia.
Magee, George, do.
Muhlenberg H. H., Reading.
McDowell, John, Washington.
Murray, William F., Harrisburg.
McAllister, Archibald, Springfield Furnace, Blair county.
Metzger, William, Harrisburg.
Murdock, A. C., Pittsburgh.
Merrick, George, Northumberland.
McAllister, John C., Fort Hunter, Dauphin county.
Maxwell, Henry D., Easton,
Myers, Henry, Forty Fort.
Marcy, Ira, Wilkes-Barre.
Martin, Dewees J., Allentown.
Mutchler, John, Easton.
McMinn, J. M., Williamsport.

Mudge, Hiram, Williamsport.
Monday, S. S., do.
McLowell, Lewis, do
McCormick, Robert, Montoursville.
Moore, Wesley, Newberry.
Mahaffey, David, Cogan Station.
Mahaffey, Lindsey, Newberry.
McMicken, J. B., Williamsport.
Miller, Larr, Wayne, Clinton county.
Mahaffey, William J., Newberry.
Maxwell, Jacob S., Williamsport.
Miles James, Milesgrove.
Morse, H. S., Williamsport.
Montgomery, J. B., do.
Munday, H. F., do.
Morrison, S. G., do.
Morris, John C., Friendsville.
McCauley, George W., Harrisburg.
Messinger, Samuel, Easton.
McCain, Daniel, Allegheny City.
McKelvy, James, Wilkinsburg, Allegheny county.
Morris, D. B., Pittsburgh.
McPherson, J. S., Wilkins.
McNish, A. L., Pittsburgh.
Marchard, John, Pittsburgh.
Magan, David, New Brighton, Beaver county.
McFarland, John, Northumberland.
Montgomery, Joseph, Harrisburg.
Myers, Charles E., Philadelphia.
Motter. John, Harrisburg.
Mark, George M., do.
Middleton, Richard, do.
Miller, William H., do.
Mumma, David, do.
McFarland, George F., do.
McConkey, Elbridge, do.
McDonald, Lewis, do.
McCormick, David, do.
Miller, J. G., do.
McCormick, James, do.
Morse, L. W., Ledgedale, Wayne county.
Moore, E. B., West Chester.
McKean, James S., Pittsburgh.
Miller, John M., Hickory. Washington county.
McPherson, Edward, Gettysburg.
Monaghan, R. E., West Chester.
Meyers, B. F., Harrisburg.
McClure, A. K., Philadelphia.
McDowell, John, Washington.
McCaughey, J. A., Downingtown.
Mackey, L. A., Lock Haven.
Neilson, Robert, Philadelphia.
Neff, Robert K., do.
Newton, G. B., Springfield, Delaware county.
Noble, John, Carlisle.
Noble, F. W., Easton.
Nissley, John J., Hummelstown.
Nicely George W., Newberry.
Nutting, Lyman, Pine Grove, Schuylkill county.
Nichols, Joseph, Williamsport.
Nichols, W. F., do.
Neilman, D. H., Easton.
Nissley, Joseph, Harrisburg.
Opp, George S., Maryland, Lycoming county.
Otstott, Jacob H., Harrisburg.
Odenweider, Henry L., Easton.
Olewine, Benjamin, Harrisburg.
Ott, Leander N., Dauphin county.
Pugh, Charles E., Philadelphia.
Packer, William F., Williamsport.
Pritchett, Borradale, Frazier, Chester county.
Perrott, W. S., Philadelphia.
Pennock, Samuel, Kennett Square, Chester county.
Pratt, Thomas, Philadelphia.
Pomroy, John L., do.
Peyson, Auguste, do.
Presbury, George G., Jr., Philadelphia.
Priestly. J. P., Nothumberland.
Parsons, H. K., Harrisburg.
Peters, Benjamin G., do.
Pennock, Joseph, do.
Patterson, Robert H., Pittsburgh.
Paxton, Joseph, Catawissa.
Polen, Albert, Wyoming.
Peters, C. P., Concordsvillle.
Potts, E. Channing, Norristown.
Parsons, Leroy, Harrisburg.
Pyle, R. C., Easton.
Purcell, Sylvester, Bloomsburg.
Parsons, Henry C., Williamsport.
Piatt, John, do.
Pollock, Samuel, do.
Porter, John F., Newberry.
Parker, Samuel J., Williamsport.
Perkins, H. J., do.
Pownell, A., Philadelphia.
Perkins, James E., Lemar.
Page, A., Williamsport.
Post, G. S., do.
Parke, John E., Pittsburgh.
Patterson, Lebanon Church, Allegheny county.
Phelps, W. H., Pittsburgh.
Pemberton, Clifford, do.
Phillips, John, do.
Power, John, Harrisburg.
Parsons, George W., do.
Postlethwaite, E. T., Philadelphia.
Patterson, John, Glenmore, Chester county.
Paxson, J. A., Philadelphia.
Rogers, C. B., do.
Roberts, Algernon S., do.
Rutheford, John P., Harrisburg.
Roberts, Isaac, Norristown.
Rudman, William C., Philadelphia.
Robeson, H. P., Robesonia, Berks county.
Rodgers, Fairman, Philadelphia.
Rhodes, William A., do.
Relf, C. P., do.
Rutherford, S. S., Harrisburg.
Rutherford, Abner, do.
Reily, John A., do.
Rodd, Jacob, Pittsburgh.
Robinson, ——, Philadelphia.
Rutter, Nathaniel, Wilkes-Barre.
Ross, William S., do.

Rutherford, John B., Harrisburg.
Ruggles, A. C., Williamsport.
Rutherford, W. F., Paxton.
Reighard, James B., Newberry.
Reighard, Daniel, do.
Renninger, W. H., Williamsport.
Rook, D. N., do.
Rank, L. D., do.
Rouse, William A.. Harrisburg.
Reed, Alexander, Lock Haven.
Rodenbough, Joseph S., Easton.
Reeder, Mrs A. H., do.
Richards, Henry, do.
Reigel, Joseph, do.
Roth, Jeremiah, Allentown.
Rogers, Felix, Pittsburgh.
Rowley, Thomas A., Pittsburgh.
Roberts, George B., Philadelphia.
Russell, Alexander H., Harrisburg.
Rogers, Lucius, Smethport, McKean county.
Raymond, James, Harrisburg.
Reel, Augustus, do.
Rutherford, William S., do.
Reel, John, do.
Reed, James, Middle Paxton, Dauphin county.
Reichenbach, E. C.. Harrisburg.
Rudy, Joseph, do.
Rutherford, F. W., Paxton.
Rupp, Henry S., Shiremanstown, Cumberland county.
Rutherford, J. F., Harrisburg.
Rhey, George, Millwood, Westmoreland county.
Richmond, William H., Carbondale.
Rand, George W., Scranton.
Reed, E. W.. Erie.
Rutherford, Silas, Paxton.
Rutherford, J. Q. A., Paxton.
Risher, J. D., Pittsburgh.
Rutherford, S. Parke, Cochranville, Chester county.
Savery, Peleg B., Philadelphia.
Stambaugh, S. C., Lancaster.
Sergeant, William, Philadelphia.
Strouble, Jacob, Zion, Centre county.
Snow, Edward K., Philadelphia.
Sharp, Joseph W., Pniladelphia.
Smith, Daniel, Jr., Philadelphia.
Scull, Gideon, Philadelphia.
Silverthorn, M. H., Fairview, Erie county.
Starr, Isaac, Philadelphia.
Shoemaker, B. A., Philadelphia.
Schaffer, W. L., Philadelphia.
Speer, William W., Pittsburgh.
Spencer, S. S., Lancaster.
Swift, Joseph, Philadelphia.
Slade, Alfred, Philadelphia.
Stuart, George H., Philadelphia.
Small Samuel, York.
Sharwood, Dendy, Philadelphia.
Speer, Alexander, Pittsburgh.
Stokes, William A., Greensburgh.
Sturdevant, E. W., Wilkes-Barre.
Sheets, J. H. Von, Orwigsburg.
Shoemaker, William M., Wyoming.
Sturdevant, E. J., Wyoming.
Shyrock, M., Philadelphia.
Speece. L. B., Wyoming.
Smith, J. B., Dunmore.
Shoemaker, William S., Wyoming.
Schooley, J. B.. Wyoming.
Smith, J. B., Plymouth.
Shoemaker, Elijah, Kingston.
Sharp, John, Jr., Wyoming.
Stark, J. B., Wilkes-Barre.
Stephens, Z., Scranton.
Sower, F. D., Norristown.
Schall, David, Norristown.
Schreiber, O. L., Laubach, Northampton county.
Sigman, Joseph, Easton.
Snyder, Daniel W., Easton.
Schreiner, J. W., Lewisburg.
Singer Manufacturing Company, Philadelphia.
Swan Rufus C., Williamsport.
Sheffler, A. G., Williamsport.
Smith, Henry B., Williamsport.
Smith, Joseph W., Newberry.
Stearns, L. L., Williamsport.
Stewart, Robert, Lemar.
Showers, Jesse, Rauch Gap.
Smith, Thomas, Williamsport.
Showers, D. H., do.
Smith, Daniel W.. do.
Saxton, J. O., New Kingston.
Shaw, Hugh, Jersey Shore.
Smith, J. D. L., Mill Hall.
Seltzer, George L., Myerstown.
Seitz, George, Easton.
Seitz, Frederick, Easton.
Serch, David, Easton.
Scott, John, Pittsburgh.
Sharpless, S. J., Street Road, Chester county.
Smith, George, New York city.
Seiler, Daniel W., Harrisburg.
Shoemaker, John, do.
Scheffer, Theodore, do.
Smith, Jacob, do.
Shaffer, William S., do.
Simon, John B., do.
Smull, John A., do.
Shellenberger, Henry, do.
Scott, George, Catawissa.
Sharp, Samuel W., Newville.
Sheck, J. H., Harrisburg.
Silkman, William M., Scranton.
Smith, H. K., Philadelphia.
Sharpless, Charles L., do.
Singerly, W. M., do.
Smith, George Handy, do.
Steel, John M., Greensburg.
Steel, William, do.
Smith, Philip L., Philadelphia.
Shaner, Jefferson, West Chester.
Thompson, John I., Half Moon, Centre county.
Thomas, George, Whitford, Chester county.
Thatcher, Richard, Marsh, Chester county.
Thompson, N. B., Philadelphia.

Tatham, H. B., Philadelphia.
Tatham, George N., do.
Towers, William H., do.
Taggart, David, Northumberland.
Taggart, John, do.
Tasker, Thomas T., Philadelphia.
Tripp, Ira, Scranton.
Trout, Michael C., Sharon, Mercer county.
Tyson, Carrol S.. Norristown.
Thomas, Henry, Harrisburg.
Templin, James R., Easton.
Taylor, Benjamin H., Williamsport.
Taylor, Horace E., do.
Thompson, James, Cogan Station.
Trump, Edward D., Jersey Shore.
Tinsman, Garrett, Williamsport.
Thayer, Russel A., Allentown.
Templin, William, Harrisburg.
Taylor, William, Womelsdorf, Berks county.
Taylor, B. Frank, Womelsdorf, Berks county.
Taylor, George R., Womelsdorf, Berks county.
Thomson, Frank, Philadelphia.
Twaddell, L. H., do.
Urquehart, John, Wilkes-Barre.
Updegraff, A., do.
Updegraff, Thomas, Newberry.
Updegraff, Daniel, do.
Updegraff, Derrick, do.
Unger, David J., Harrisburg.
Unger, John G., do.
Van Leer, Isaac W., Wallace, Chester county.
Vouges. James C., Philadelphia.
Vanvoorhis, H. B., Pittsburgh.
Vanscoy, Daniel, Wyoming.
Van Vorce, John, Williamsport.
Van Buskirk, S., do.
Vandyke, James, Northumberland.
Walker, George, Montrose.
Watts, Frederick, Carlisle.
Walker, R. C., Elizabeth, Allegheny county.
Wood, Robert, Philadelphia.
Waterman, Joseph, do.
Watson, Joanna, do.
Welsh, John, do.
Welsh, Samuel, do.
Weaver, H. A., do.
Wright, Joshua, Washington county.
Watson, A. W., Harrisburg.
Walters, S. H., Northumberland.
Wright, Joshua, Findleyville, Washington county.
Waterman, Albert G., Philadelphia.
Wood, Thomas, Penningtonville.
Woodhams, Samuel, Plymouth.
Williams, Stiles, Wilkes-Barre.
Wright, H. B., do.
Walters, Townsend, West Chester.
Wetherill, William, Norristown.
Wetz, Thomas H., do.
Whitman, Joseph, Centre Valley P. O.
Williams, E. C., Harrisburg.
Welch, Benjamin G., Pittston.
Woodward, John V., Williamsport.
Watson Oliver, do.
White, Henry, do.
Wolf, Peter, do.
Wingard. Samuel C., do.
Watson, Henry W., do.
Weaver M. B., do.
White, John, do.
Wait, B., do.
Wood, James M., do.
Wescott, Thomas S., Ashland, Schuylkill county.
Ward, C. L., Towanda.
Werkheiser, Enos, Easton.
Wallace, W. W., Pittsburgh.
Washington, W. P., Shamokin.
Why, John, Jr., Pittsburgh.
White, J. A. G., Osceola, Clearfield county.
Wallower, John, Harrisburg.
Winters, George, do.
Wolfinger, Levi, do.
Wible, William, Gettysburg.
Watts, William M., Mechanicsburg.
Warford, A. B., Harrisburg.
Wolf, William, do.
Wilhelm, A., Cornwall.
Walker, John H.. Erie.
Waggoner, John A., Harrisburg.
Wilson, D. Y., Gum Tree, Chester county.
Walter, D. J., Bloomsburg.
Yeager, Joseph, Philadelphia.
Young, Alexander, do.
Yeaton, William H., do.
Youngman, George W., Williamsport.
Young, William, Easton.
Young, John, Jr., Ewing's Mills, Allegheny county.
Young, A. P., Millville, Columbia county.
Young, James, Middletown.
Ziegler, John H., Harrisburg.
Zimmerman, F., Williamsport.
Zimmerman, A. M., Harrisburg.
Zerbe, Cyrus, do.

GROUP VIII.—DOGS.

[The awards of premiums for dogs were received too late for insertion in their proper place, page 95.]

MASTIFFS.

W. P. Stevenson, 17 Broad street, New York,	2 Champion Medals.
“ “ “	$20 00
“ “ “	Silver Medal.
“ “ “	$10 00
W. S. Johnson, Chelton avenue, Germantown, Pennsylvania,	20 00
E. R. Coleman, Lebanon, Pennsylvania,	10 00
A. Brock, Lebanon, Pennsylvania,	Silver Medal.
C. R. Colwell, Weymouth, New Jersey,	$10 00
“ “ “	10 00
“ “ “	2 Silver Medals.
W. P. Stevenson, 17 Broad street, New York,	V. H. C.*
E. W. Jester, St. George's, Delaware,	V. H. C.
A. Grant, West New Brighton, Staten Island,	V. H. C.
A. Brock, Lebanon, Pennsylvania,	C.†

ST. BERNARDS—*Rough Coated.*

John W. Burgess, East Orange, New Jersey,	$20 00
W. J. Ehrick, 285 Eighth avenue, New York,	10 00
Buena Vista Kennels, Box 1338, New York city,	Silver Medal.
“ “ “	$20 00
“ “ “	10 00
Montgomery & Hasbrouck, Bergenfield, New Jersey,	10 00
“ “ “	Silver Medal,
Hospice Kennels, Newark, New Jersey,	Silver Medal
Hospice Kennels, Newark, New Jersey,	H. C.‡
Montgomery & Hasbrouck, Bergenfield, New Jersey,	V. H. C.
Theo. H. Doane, Thirty-second and Powelton avenue, Philadelphia,	V. H. C.

Smooth Coated.

Montgomery & Hasbrouck, Bergenfield, New Jersey,	Champion Medal.
“ “ “	$10 00
H. H. Chittenden, 160 Broadway, New York,	20 00
Dr. E. J. Birmingham, 1285 Broadway, New York,	20 00
S. J. Martinet, Jr., 13 Lexington street, Baltimore, Md.,	Silver Medal.
W. S. Kingsland, Babylon, Long Island,	$10 00
Jos. E. Wilkinson, Baltimore, Maryland,	Silver Medal.
Hospice Kennels, Newark, New Jersey,	V. H. C.
Montgomery & Hasbrouck, Bergenfield, New Jersey,	H. C.
L. Blank, 255 South Ninth street, Philadelphia,	C.

NEWFOUNDLANDS.

J. A. Nickelson, Box 2574, Boston, Massachussets,	Champion Medal
Daniel O'Shea, 892 Waterloo street, London, Ontario, Canada,	$20 00
G. Schoew, 211 South Tenth street, Philadelphia,	10 00

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*Very highly commended. †Commended. ‡Highly commended.

P. S. Frick, 3300 North Fifth street, Philadelphia, . .	Silver Medal.
C. Dittess, 252 North Tenth street, Philadelpdia, . . .	V. H. C.
Frank Read, 400 Chestnut street, Philadelphia, .	H. C.
W. Leudrum, 174 Sixth street, Jersey City, New Jersey,	C.

ULMERS.

Thomas O'Brien, 4632 Seneca street, West Philadelphia,	$10 00
Conard Wagner, Norristown, Pennsylvania, . . .	Silver Medal.
James P. McQuaid, 519 Arch street, Philadelphia, . .	V. H. C.
P. Stamp, Bridgeport, Montgomery county, Pennsylvania, ...	H. C.

COLLIES.

H. M. Perry, 3501 Hamilton street, Philadelphia, . . .	Champion Medal.
“ “ “ “ . . .	$10 00
“ “ “ “ . .	5 00
Associated Fanciers, 237 South Eighth street, Philadelphia, ...	10 00
Geo. H Whitehead, Trenton, New Jersey, ...	5 00
Jas. Lindsay, Jersey City, New Jersey, ...	2 Silver Medals.
Montgomery & Hasbrouck, Bergenfield, New Jersey,	2 Silver Medals.
Mitchell Harrison, 101 South Front street, Philadelphia,	$10 00
“ “ “ “	H. C.
Jas. Lindsay, Jersey City, New Jersey, ...	C.

DEER HOUNDS.

Clovernook Kennels, 185 Fifth avenue, New York, . .	Champion Medal
“ “ “ “ . .	$5 00

GREYHOUNDS.

H. W. Smith, Box 876, Worcester, Massachusetts, . .	2 Champion Medals.
“ “ “ “ . . .	$10 00
“ “ “ “ . . .	10 00
Bessie Whaiton Smith, Claymont, Delaware, ...	Silver Medal.
I. H. Sheppard, 629 North Twenty-ninth street, West Philadelphia, . .	Silver Medal.
Mrs. B. Labe, 1231 North Seventh street, Philadelphia,	$5 00
Eugene Loeb, 221 North Third street, Philadelphia, . .	H. C.

POINTERS.

J. H. Phelan, 75 Clifton Place, Jersey City, ...	$20 00
“ “ “ “	20 00
“ “ “ “	10 00
C. J. Peshall, Jersey City, New Jersey, ...	10 00
E. J. Martin, Wilmington, Delaware, ...	Silver Medal.
A. H. Craige, Randolph and Jefferson streets, Philadelphia, ...	$10 00
Chas. Jacob, Hoboken, New Jersey, ...	Silver Medal.
Percy C. Ohl, Jobstown, New Jersey, ...	$20 00
Westminster Kennel Club, Babylon, Long Island, . . .	10 00
“ “ “ “ “ . . .	20 00
A. W. Tobey, 406 Walnut street, Philadelphia, ...	Silver Medal.
Surrey Kennels, Ellicott City, Maryland, ...	Silver Medal.
T. Harrison Farquhar, Torresdale, Pennsylvania, . . .	$10 00

Joseph Trissler, Lancaster, Pennsylvania,	Silver Medal.
V. M. Haldeman, Gen. Wayne, Delaware county, Pennsylvania,	$10 00
H. J. Bennett, Trenton, New Jersey,	Silver Medal.
R. C. Cornell, 54 William street, New York,	V. H. C.
Surrey Kennels, Ellicott City, Maryland,	V. H. C.
J. H. Phelan, Jersey City, New Jersey,	V. H. C.
Alex. Meais, Bethlehem, Pennsylvania,	V. H. C.
J. S. Wibirt, Mauch Chunk, Pennsylvania,	V. H. C.
D. P. McAyers, Wilkes-Barre, Pennsylvania,	H. C.
Westminster Kennel Club, Babylon, Long Island,	H. C.
“ “ “ “	H. C.
Arthur Brock, Lebanon, Pennsylvania,	C.

ENGLISH SETTERS.

Frank Windholts, 525½ Sixth avenue, New York,	$20 00
Percy C. Ohl, Jobstown, New Jersey,	20 00
“ “ “ “	2 Silver Medals.
E. W. Jester, St. George's, Delaware,	$20 00
W. Yewdall, Fifty-fourth and Paschall streets, Philadelphia,	10 00
E. I. Martin, Wilmington, Delaware,	2 Silver Medals.
R. C. Cornell, 54 William street, New York,	$20 00
John Yewdall, Fifty-fourth and Paschall streets, Philadelphia,	10 00
H. W. Johnson, Kintnersville, Bucks county, Pennsylvania,	10 00
H. W. Johnson, Kintnersville, Bucks county, Pennsylvania,	10 00
Percy C. Ohl, Jobstown, New Jersey,	V. H C.
“ “ “ “	V. H. C.
“ “ “ “	V. H. C.
E. W. Jester, St. George's, Delaware,	V. H. C.
H. Pape, Hoboken, New Jersey,	V. H. C.
E. I. Martin, Wilmington, Delaware,	V. H. C.
“ “ “	V. H. C.
“ “ “	V. H. C.
Percy C. Ohl, Jobstown, New Jersey,	H. C.
T. B. Stulb and Wm. Wood, Linwood, Pennsylvania,	H. C.
Percy C. Ohl, Jobstown, New Jersey,	H. C.
E. Comfort, 15 North Seventh street, Philadelphia,	H. C.
Geo. Fox, 1711 Spring Garden street, Philadelphia,	V. H. C.
H. J. Rice, 80 Fulton Market, New York,	H. C.

IRISH SETTERS.

Max Wenzell, Hoboken, New Jersey,	$20 00
“ “ “	Silver Medal.
J. H. Roberts, Box 153, Moorestown, New Jersey,	$20 00
“ “ “ “	10 00
“ “ “ “	20 00
“ “ “ “	Silver Medal.
E. W. Clark, Jr., 35 South Third street, Philadelphia,	$20 00
W. W. Kendell, Box 1615, Philadelphia,	10 00
R. H. Spalding, Wilkes-Barre, Pennsylvania,	10 00

Samuel Barr, Forty-fourth and Haverford streets, West Philadelphia,	Silver Medal.
T. Farley, Albany, New York,	$10 00
W. J. Holly, 1221 Walnut street, Philadelphia,	Silver Medal.
H. B. Goetchues, Hoboken, New Jersey,	V. H. C.
E. Volmer, Trenton, New Jersey,	V. H. C.
C. Hartman Kuhn, 1712 Spruce street, Philadelphia,	H. C.
George W. Bush, Jr., Wilmington, Delaware,	H. C.
Max Wenzell, Hoboken, New Jersey,	H. C.
J. H. Roberts, Box 153, Moorestown, New Jersey,	H. C.
“ “ “ “	H. C.
Samuel Barr, Forty-fourth and Haverford streets, West Philadelphia,	H. C.
C. Roedenburg, Hoboken, New Jersey,	C.
P. Russ, Harrisburg, Pennsylvania,	C.
Max Wenzell, Hoboken, New Jersey,	C.
John S. Brown, 932 Franklin street, Philadelphia,	C.

GORDON SETTERS.

H. Clay Glover, 1293 Broadway, New York,	$20 00
Edward Maher, 407 South Eleventh street, Philadelphia,	20 00
Linn Hartranft, Lafayette Hotel, Philadelphia,	10 00
Edward G. Webb, 904 Chestnut street, Philadelphia,	Silver Medal.
H. Clay Glover, 1293 Broadway, New York,	$20 00
Daniel O'Shea, 892 Waterloo street, London, Ontario, Canada,	10 00
W. J. Keegan, Clifton, Delaware county, Pennsylvania,	10 00
I. Murray Jordan, 4103 Chestnut street, Philadelphia,	Silver Medal.
George Mac Millar, 411 South Third street, Camden, New Jersey,	H. C.

SPANIELS.

A. C. Wilmerding, 84 Broadway, New York,	Champion Medal.
“ “ “	$5 00
“ “ “	10 00
George H. Whitehead, Trenton, New Jersey,	10 00
Associated Fanciers, 237 South Eighth street, Philadelphia,	Silver Medal.
A. E. Rendel, 2 Wall street, New York,	Champion Medal.
W. H. Tuck, Wilkes-Barre, Pennsylvania,	$10 00
“ “ “	5 00
Hornell Spaniel Club, Hornellsville, New York,	5 00
“ “ “ “ “	2 Silver Medals.
Andrew Laidlaw, Woodstock, Ontario, Canada,	Silver Medal.
“ “ “ “	$10 00
S. R. Hemingway, 9 High street, New Haven, Connecticut,	5 00
W. West, Camden, New Jersey,	Silver Medal.
Marmaduke Richardson, 33 Maiden Lane, New York,	$10 00
“ “ “	5 00
“ “ “	Silver Medal.
Clarence Lewis, 1811 Walnut street, Philadelphia,	V. H. C.
H. Whitaker, 1319 Patton street, Philadelphia,	V. H. C.

John Lynch, 3926 Girard avenue, Philadelphia,	V. H. C.
Hornell Spaniel Club, Hornellsville, New York,	V. H. C.
Percy H. Clark, Germantown, Pennsylvania,	H. C.
Clarence Lewis, 1811 Walnut street, Philadelphia,	H. C.
Hornell Spaniel Club, Hornellsville, New York,	C.

Fox Hounds.

J. J. Hickman, Cheyney, Deleware county, Pennsylvania,	$10 00
“ “ “ “	5 00
G. Prizer, Lionville, Chester county, Pennsylvania,	5 00
“ “ “ “	Silver Medal.
Daniel O'Shea, London, Ontario, Canada,	$10 00
“ “ “ “	Silver Medal.
“ “ “ “	V. H. C.
G. Prizer, Lionville, Chester county, Pennsylvania,	$5 00
“ “ “ “	Silver Medal.

Beagle Hounds.

Daniel O'Shea, London, Ontario, Canada,	Champion Medal.
“ “ “ “	$10 00
“ “ “ “	Silver Medal.
A. C. Krueger, Wrightsville, Pennsylvania,	Champion Medal.
L. Sloan, 4209 Chestnut street, Philadelphia,	$10 00
“ “ “	5 00
J. Satterthwaite, Jenkintown, Pennsylvania,	5 00
H. C. Wolf, Lewisburg, Pennsylvania,	2 Silver Medals.
L. H. Twaddell, Forty-seventh street and Baltimore avenue, Philadelphia,	$5 00
P. Dorsey, New Market, Frederick county, Maryland,	Silver Medal.
W. T. Streeter, Lehigh Tannery, Carbon county, Pennsylvania,	$10 00
W. T. Streeter, Lehigh Tannery, Carbon county, Pennsylvania,	5 00
Caleb Wilson, William Penn post-office, Montgomery county, Pennsylvania,	C.

Basset Hounds.

C. B. Gilbert, New Haven, Connecticut,	$10 00
Maizeland Kennels, Red Hook, Duchess county, New York,	Silver Medal.

Dachshundes.

V. Friehl, 1030 Sansom street, Philadelphia,	Silver Medal.

Bull Dogs.

J. E. Thayer, Lancaster, Massachusetts,	Champion Medal.
“ “ “	$10 00
“ “ “	10 00
“ “ “	5 00
C. R. Snowden, Haverford College, Pennsylvania,	5 00
A. E. Norris, Chestnut Hill, Philadelphia, Pennsylvania,	H. C.
John H. Sanderson, 212 South Fifth street, Philadelphia, Pennsylvania,	C.

BULL TERRIERS.

R. H. Dudgeon, 24 Columbia street, New York,	$10 00
F. F. Dole, New Haven, Connecticut,	10 00
R. H. Dudgeon, 24 Columbia street, New York,	Silver Medal.
F. F. Dole, New Haven, Connecticut,	$5 00
S. Handford, 1709 Cayuga street, Philadelphia,	V. H. C.

BLACK-AND-TAN TERRIERS.

Miss Lizzie E. Thompson, 44 South Fourth street, Philadelphia,	Silver Medal.

FOX TERRIERS.

J. E. Thayer, Lancaster, Massachusetts,	2 Champion Medals.
“ “ “	$5 00
August Belmont, Jr., 19 Nassau street, New York,	10 00
Clovernook Kennels, 185 Fifth avenue, New York,	5 00
“ “ “	10 00
“ “ “	5 00
“ “ “	Silver Medal.
Robert Lyon, New Brighton, Staten Island, New York,	Silver Medal.
George W. Bush, Jr., Wilmington, Delaware,	Silver Medal.
William B. James, 2213 Linn street, Philadelphia,	$5 00
Daniel O'Shea, London, Ontario, Canada,	Silver Medal.
R. H. Barlow, 1607 Chestnut street, Philadelphia,	$10 00
“ “ “	Silver Medal.
H. A. North, Delaware Mutual Ins. Co., Philadelphia,	V. H. C.
J. L. Banks, 79 Fifth avenue, New York,	V. H. C.
R. H. Barlow, 1607 Chestnut street, Philadelphia,	V. H. C.
“ “ “	V. H. C.
Robert Ives Crocker, 583 Fifth avenue, New York,	H. C.
Thomas B. Wanamaker, Jenkintown, Pennsylvania,	H. C.
Samuel Andrews, 3804 Mt. Vernon street, Philadelphia,	H. C.
Seth Lumb, Wissahickon, Philadelphia,	H. C.
R. H. Barlow, 1607 Chestnut street, Philadelphia,	H. C.
B. Cunningham, 47 Tulpehocken street, Philadelphia,	C.

ROUGH-HAIRED TERRIERS.

Daniel O'Shea, London, Ontario, Canada,	$10 00
Charles T. Thompson, 1057 Richmond street, Philadelphia,	Silver Medal.

BEDLINGTON TERRIERS.

Fred. P. Kirby, 22 N. Forty-first street, W. Philadelphia,	$10 00
Daniel O'Shea, London, Ontario, Canada,	10 00

SKYE TERRIERS.

W. P. Sanderson, 4202 Baltimore avenue, West Philadelphia,	10 00
James Howard, 3801 Elm avenue, West Philadelphia,	5 00
W. P. Sanderson, 4202 Baltimore avenue, West Philadelphia,	Silver Medal.

YORKSHIRE TERRIERS.

Mrs. Jane Parker, 502 N. Eleventh street, Philadelphia,	$10 00
“ “ “	Silver Medal.

James Healey, 759 South Third street, Philadelphia,	$10 00
Mrs. Jane Parker, 502 N. Eleventh street, Philadelphia,	V. H. C.

Toy Terriers.

Miss Ella E. Brown, 10 Van Nest Place, New York,	$10 00
F. W. Sutterle, 1335 Brown street, Philadelphia,	Silver Medal.
Edw. B. Hirst, Seville street, Manayunk, Philadelphia,	V. H. C.

Pugs.

Mrs. Walter D. Peck, New Haven, Connecticut,	$10 00
" " "	5 00
Miss Sciota Meeks, 470 N. Seventh street, Philadelphia,	5 00
Mrs. Jas. Watts Mercur, Wallingford, Delaware county, Pennsylvania,	Silver Medal.
A. H. Moore, 1711 Spring Garden street, Philadelphia,	$10 00
M. H. Cryer, 1423 Chestnut street, Philadelphia,	Silver Medal.
Chequassett Kennels, Lancaster, Massachusetts,	$5 00
M. H. Cryer, 1423 Chestnut street, Philadelphia,	Silver Medal.
John Parker, 502 North Eleventh street, Philadelphia,	V. H. C.
Mrs. H. C. North, Germantown, Philadelphia,	V. H. C.
Chequassett Kennels, Lancaster, Massachusetts,	V. H. C.
F. P. Bannon, 5251 Main street, Germantown, Philadelphia,	C.
Mrs. James B. Reddie, 122 West Seventeenth street, New York,	C.
Charles C. Royce, Germantown, Philadelphia,	C.
Mrs. Jas. Watts Mercur, Wallingford, Delaware county, Pennsylvania,	C.

King Charles Spaniels.

James B. Reddie, 122 W. Seventeenth street, New York,	$10 00
" " "	Silver Medal.
John Parker, 502 North Eleventh street, Philadelphia,	V. H. C.
Miss Mary E. Ward, Port Chester, West Chester county, New York,	V. H. C.
John Parker, 502 North Eleventh street, Philadelphia,	H. C.
" " "	C.

Blenheim Spaniels.

W. Phillips, 150 West Fifty-sixth street, New York,	$10 00
Miss Mamie Phillips, 150 West Fifty-sixth street, New York,	Silver Medal.
Miss Maggie Parker, 502 North Eleventh street, Philadelphia,	V. H. C.
Miss Tillie Hart, 3527 Hamilton street, Philadelphia,	V. H. C.
Miss Maggie Parker, 502 North Eleventh street, Philadelphia,	H. C.
Miss Maggie Parker, 502 North Eleventh street, Philadelphia,	C.

Italian Greyhounds.

Miss Annie M. Kramer, 118 Claymont street, Philadelphia,	$10 00
A. L. Belleville, 3101 Powelton avenue, Philadelphia,	Silver Medal.

MISCELLANEOUS.

Alexander Burden, Forty-ninth and Market streets, Philadelphia,	$10 00
Glencoe Collie Kennels, East Bethlehem, Pennsylvania,	10 00
M. C. Harvey, Paoli, Pennsylvania,	10 00

FOX HOUND—PACKS.

J. J. Hickman, Cheyney, Deleware county, Pennsylvania,	50 00
Rose Tree Hunt, Media, Pennsylvania,	15 00

KENNEL PRIZES.

Rancocas Kennels, (English Setters,) Jobstown, New Jersey,	25 00
I. Hy. Roberts, (Irish Setters,) Box 153, Moorestown, New Jersey,	25 00
Winlawn Kennels, (Mastiffs,) 17 Broad street, New York,	25 00
Milbrook Kennels, (St. Bernards,) Bergenfield, New Jersey,	25 00
H. W. Smith, (Greyhounds,) Worcester, Massachusetts,	25 00
James H. Lindsay, (Collies,) Jersey City, New Jersey,	25 00
Westminster Kennel Club, (Pointers,) Babylon, New York,	25 00
Hornell Spaniel Club, (Spaniels,) Hornellsville, New York,	25 00

E. COMFORT,
Secretary Philadelphia Kennel Club.

INDEX TO PROCEEDINGS

OF

PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

Page.

Agricultural Societies, Historical Sketch of early, by B. Landreth, ... 148
Agricultural machinery, premiums awarded for, ... 109
Analyses of the milk of prize cows, ... 26
Apparel, premiums awarded for, ... 128
Aquatic fowls, prizes awarded for, ... 87
Awards of the juries, section 1, ... 62
Awards of the juries, section 2, ... 122
Ayrshires, prizes awarded for, ... 67
Bees, prizes awarded for, and for hives and appliances, ... 94
Berries and nuts, premiums awarded for, ... 104
Birds, cage and ornamental, prizes awarded for, ... 93
Blight, G., Historical Sketch of Philadelphia Society for Promoting Agriculture, ... 139
Branson, D. H., report on carp culture, 48
Branson, D. H., experiments on cereals, ... 5
Brick and tile-making machines, premiums awarded for, ... 124
Buildings on fair ground, cost of, ... 36
Buildings, inclosures, and roads, premiums awarded for appliances, ... 133
Cameron, J. Donald, thanks for his donation of case of samples of wools of the world, ... 33
Carbon disulphide as an insecticide, .. 30
Carp-culture in Chester and Delaware counties, report on, ... 48
Carriages, pleasure, premiums awarded for, ... 109
Cattle, prizes awarded for, ... 64
Cereals, Mr. Branson's experiments on, ... 5
China and glassware, premiums awarded for, ... 131

Page.

Committee of arrangement Pennsylvania State Society, ... 61
Committees of coöperation, ... 61
Committee of arrangement, section 2, Society of Arts, ... 116
Competitive trial of wind-mills, ... 10
Confectionery, premiums awarded for, 135
Constitution of the Society, ... 151
Creamometer, displacement, ... 29
Culinary appliances, premiums awarded for, ... 132
Dairy fittings and appliances, premiums awarded for, ... 111
Dairy products, prizes awarded for, .. 95
Designs and cut flowers, premiums awarded for, ... 107
Devons, prizes awarded for, ... 65
Discussion on experiments with wheat, 9
Discussion of report on milk analyses, 28
Displacement creamometer, ... 29
Dogs, premiums awarded for, ... 161
Draught horses, prizes awarded for, .. 63
Dress-making, premiums awarded for, 129
Drugs and chemicals, premiums awarded for, ... 127
Educational means and incentives, premiums awarded for, ... 134
Electric lighting, premiums awarded for machines, ... 126
Engines, premiums awarded for, ... 123
Essays and reports, premiums offered for, ... 138
Executive committee, proceedings of, 44
Experiments with premium seed-wheat and oats, ... 5
Farinaceous products, premiums awarded for, ... 104
Field crops, premiums offered for, ... 137
Fine arts, premiums awarded for, ... 135
Fleeces, prizes awarded for, ... 95

Page.

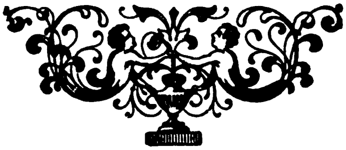
Flour and feed making machines, premiums awarded for, 112
Flowers and designs, premiums awarded for, 107
Floral Hall, notice of, 3
Fruits and nuts, premiums awarded for, 102
Fur-bearing pets, prizes awarded for, 93
Furniture, of wood and metal, premiums awarded for, 131
GALLINACEOUS fowls, prizes awarded for, 73
Gathering crops, implements for, premiums awarded for, 111
Gehr, D. O., resolution on death of, 45
Governor's message, extract relating to the Society, 32
Grain and seeds, prizes awarded for, 95
Grasses and green vegetables, premiums awarded for, 101
Guernseys, prizes awarded for, 69
HALLADAY wind-engine, test of, 11
Henderson & Co., Peter, special premium, 100
Herefords, prizes awarded for, 69
Holsteins, prizes awarded for, 66
Horses, prizes awarded for, 62
Household machines, premiums awarded for, 132
Hunter, R. M., report on wind-mill test, 10
Hunter, John, President, letter to President Wilhelm, 122
ILLUMINATION, artificial, premiums awarded for, 133
Incubators and breeders, prizes awarded for, 87
Industrial insects, prizes awarded for, 94
Insecticides, discussion on, 31
JERSEY cattle, prizes awarded for, 68
KENNEDY, Dr. A. L., report on milk analyses, 26
Kennedy. S. W. wind-engine, test of, 17
LANDRETH, B., sketch of early agricultural societies, 143
Landreth & Son, D., special premiums, 100
Leather manufactures, premiums awarded for, 130
Leffel wind-engine, test of, 13
Life members of the Society, 154
Long-wool sheep, prizes awarded for, 71
MANUFACTURES, general, premiums awarded for, 128
Manvel wind-engine, test of, 19

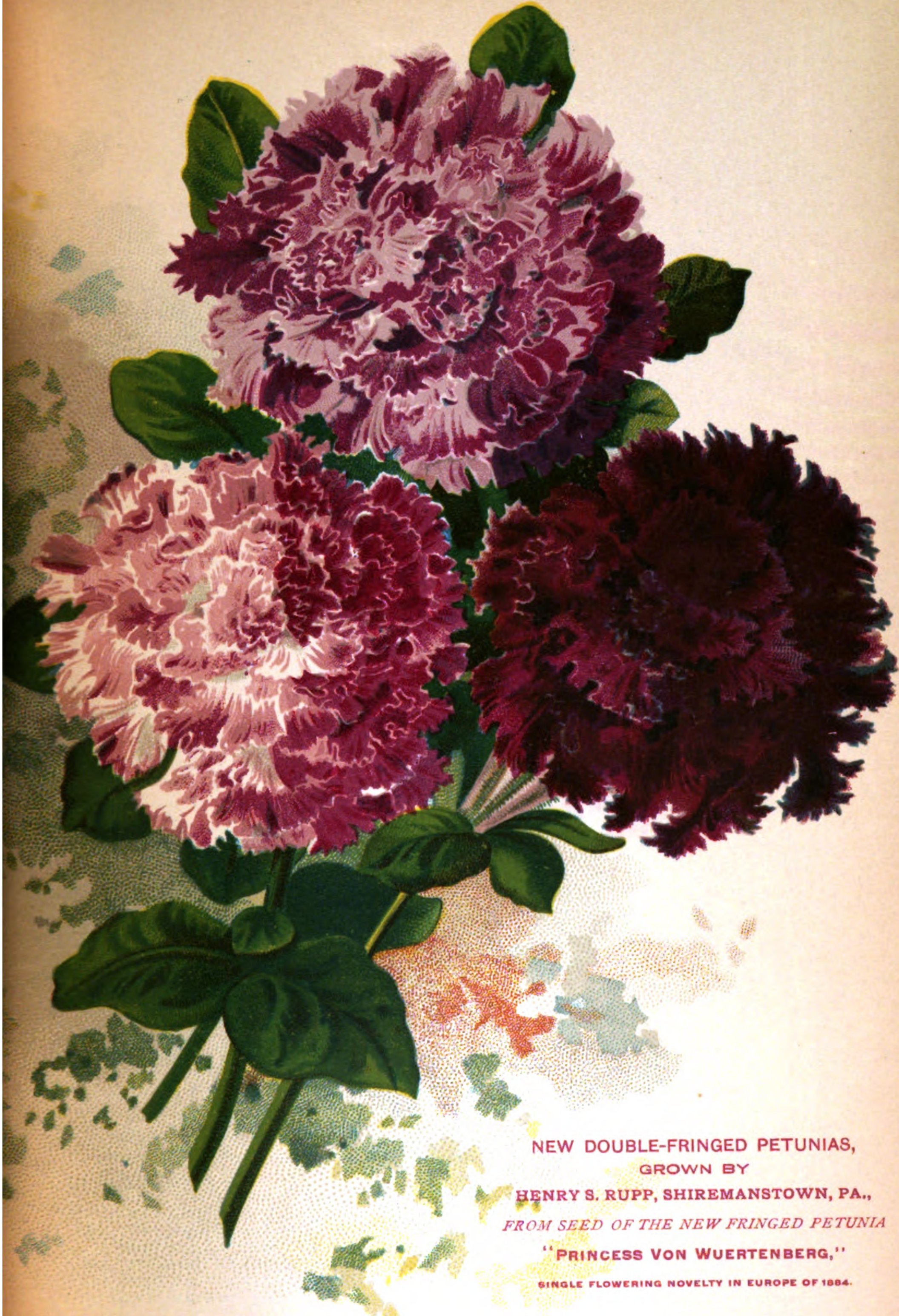
Page.

Merinos, prizes awarded for, 70
Metals, cast, forged and rolled, premiums awarded for, 122
Middle wooled sheep, prizes awarded for, 71
Milk analyses, Dr. Kennedy's, 26
Minerals, metals, machinery, and tools, general premiums awarded for, 122
Motors and means of transmitting power, premiums awarded for, 123
McDowell, John, experiments on wheat, 7
Musical instruments, premiums awarded for, 135
OFFICERS of the Society, 2
Officers elected, 1885, 41
Officers of the Society of Arts, 116
Ornamental plants and flowers, premiums awarded for, 105
Out-door sports, implements for, premiums awarded for, 136
PENNSYLVANIA State Dairymen's Association, committee, 61
Pennsylvania State Poultry Society, committee, 61
Perkins' wind engine, test of, 15
Philadelphia Bee-Keepers' Association, committee, 61
Philadelphia Kennel Club, committee, 61
Philadelphia Society for Promoting Agriculture, historical sketch of, by Mr. George Blight, 139
Pigeons, prizes awarded for, 88
Pittsburgh committee, 61
Planting and sowing, implements for, premiums awarded for, 110
Poultry and fur bearing pets, prizes awarded for, 73
Preliminary notice, 3
Proceedings of executive committee, 5
Proceedings of Society, 41
Pumps and blowers, premiums awarded for, 123
REPLY to criticisms of the Governor, 46
Report of treasurer, 43
Report on carp-culture, 48
Report of committee on Governor's message, 46
Rhey, G., resolution on ensilage, 53
Rutherford, J. B., treasurer's report, 43
Rules and regulations of exhibition, section 1, 56

Page.
Rules and regulations of exhibition, section 2, ... 119
SCHEDULE of classification, section 1,. 55
Schedule of classification, section 2,.. 118
Short-horns, prizes awarded for, ... 64
Sheep, prizes awarded for, ... 70
Soaps and perfumery, premiums awarded for, ... 127
Society of Arts, ... 4
Special premiums, D. Landreth & Son, 100
Special premium, Peter Henderson & Co., ... 100
Special dress-making premiums offered by Strawbridge & Clothier,........ 128
State Horticultural Association, committee, ... 61
Strawbridge & Clothier, special dress-making premiums, ... 128
Sub-committees of arrangement, Society of Arts,................ 116
Swine, prizes awarded for, ... 71
TESTING apparatus for wind-mills, ... 21
Textile machinery, premiums awarded for, ... 125

Page.
Treasurer Society of Arts, report of,.. 117
Treasurer's report,.................. 43
VEGETABLES and grasses, prizes awarded for,.......................... 97
Vehicles, freight and business, premiums awarded for,................. 109
WARMING apparatus, premiums awarded for,.......................... 132
Water pumped by wind-mills,........ 22
Water-supply and drainage, premiums awarded for appliances,....... 134
Wheat, experiments with,........... 6, 7
Wind, velocity and direction during wind-mill trial,................... 23
Wind-mills, competitive trial,........4, 10
Wines, premiums awarded for,....... 105
Women's Silk-Culture Association, committee, ... 61
Wood-working machines, premiums awarded for, ... 124
Wools of the wor'd. sample case received from Senator Cameron,..... 33
Working, wood and metal, machines for, premiums awarded for,....... 124





NEW DOUBLE-FRINGED PETUNIAS,
GROWN BY
HENRY S. RUPP, SHIREMANSTOWN, PA.,
FROM SEED OF THE NEW FRINGED PETUNIA
"PRINCESS VON WUERTENBERG,"
SINGLE FLOWERING NOVELTY IN EUROPE OF 1884.

REPORT

OF THE

State Horticultural Association of Pennsylvania.

CONSTITUTION.

ARTICLE 1. This Society shall be entitled the Pennsylvania Fruit Growers' Society,"* and its objects shall be the advancement of the science of pomology, and the art of fruit culture generally.

ARTICLE 2. Any person may become a member of this Society by a vote of a majority of the members present, at any meeting, and by paying into the treasury the sum of one dollar annually; or the payment of one dollar to the treasurer, at any time, shall constitute membership, and entitle said member to a copy of the proceedings. The payment of ten dollars, at one time, will constitute life membership.

ARTICLE 3. Its officers shall consist of a President, three Vice Presidents, a Recording and Corresponding Secretary, and a Treasurer, all of whom shall be elected annually by ballot.

ARTICLE 4. The following standing committees shall be appointed: A Committee of five on Nomenclature; a Committee of three on Insects, of whom the professor of entomology shall be chairman; an Executive Committee, consisting of the President, Recording Secretary, and Treasurer; † and a General Fruit Committee, consisting of one member from each county represented, with a general chairman of the whole; each member of the Local Fruit Committee to have the privilege of appointing two assistants.

ARTICLE 5. The Society may, at any time, elect honorary members.

ARTICLE 6. The Society may, from time to time, appoint professors on entomology, botany, horticultural chemistry, and geology.

ARTICLE 7. This constitution may be altered or amended by a vote of two thirds of the members present, at any regular meeting, notice of the proposed amendment, in writing, having been previously given.

ARTICLE 8. Seven members shall constitute a quorum for the transaction of business.

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*Name changed at annual meeting, January 1, 1881, by a vote of two thirds of the members present to *State Horticultural Association of Pennsylvania.*

†Amended at annual meeting, January, 1885, to read: The Executive Committee shall consist of all the elective officers of this association, and three of said committee (of which the President of the Society shall be one) shall constitute a quorum to transact any business relative to the interests of the Association.

BY-LAWS.

ARTICLE 1. The Committee on Nomenclature shall collate and decide the standard and synonymous names of all fruits known in the Society, with the authorities for each, and report, so far as practicable, at each regular meeting, and record the same in a book kept for that purpose.

ARTICLE 2. The General Fruit Committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports. Also, that the said county committee shall form *ad interim* committees for their respective counties; and further, that said *ad interim* committees are hereby authorized to publish their reports in the "*Gardener's Monthly*," or such other paper as they may select, the same having been first submitted to the chairman of the General Fruit Committee for his approval: *Provided*, That said publication shall be free of expense to the Association.

ARTICLE 3. The annual meeting of the Association shall be held on the third Wednesday of January of each year, at such a place as the Executive Committee may appoint, at which time the election for officers shall take place; said officers to serve from the close of the meeting, at which they are elected, to the close of the succeeding annual meeting, at which an exhibition and discussion of fruits shall take place, and other business transacted in the following order:

1st. Reading of minutes of previous meetings.
2d. Roll call and dues collected.
3d. Election of officers.
4th. Reports of officers.
5th. Reports of standing committees.
6th. Reports of special committees.
7th. Unfinished business of former meeting.
8th. New business.

The nomination and election of new members shall be in order at any time during the session.

ARTICLE 4. Other meetings may be convened by the Executive Committee at such time and place as they may appoint.

ARTICLE 5. No member who is in arrears for dues shall be eligible for any office, or serve on any standing committee; and any member who shall neglect to pay his dues shall cease to enjoy the privileges of membership.

ARTICLE 6. A library shall be established for the benefit of members of this Association, and a Librarian elected annually with the other elective officers.

Section 1. The Librarian shall keep an alphabetical record of the books, &c., and may loan to any member of this Association any books contained therein without cost: *Provided*, That it be returned within three months, and in as good condition as when received.

Section 2. Any member refusing to return to the Librarian books or reports from said library, shall pay its equivalent, or forfeit his membership.

LIST OF OFFICERS FOR 1885.

PRESIDENT.

CALVIN COOPER, Bird-in-Hand.

VICE PRESIDENTS.

JOSIAH HOOPES, West Chester.
H. M. ENGLE, Marietta.
W. S. BISSELL, Pittsburgh.

RECORDING SECRETARY.

E. B. ENGLE, Waynesboro.

CORRESPONDING SECRETARY.

W. P. BRINTON, Christiana.

TREASURER.

GEORGE B. THOMAS, West Chester.

LIBRARIAN.

THOMAS J. EDGE, Harrisburg.

PROFESSOR OF BOTANY.

THOMAS MEEHAN, Germantown.

PROFESSOR OF ENTOMOLOGY.

S. S. RATHVON, Lancaster.

PROFESSOR OF HORTICULTURAL CHEMISTRY.

S. B. HEIGES, Shippensburg.

COMMITTEES FOR 1885.

GENERAL FRUIT COMMITTEE.

Cyrus T. Fox, *Chairman*, Reading, Berks county.

COUNTY.	MEMBERS.	P. O. ADDRESS.
Adams,	J. L. Sherfy,	Gettysburg.
Allegheny,	E. P. Swift,	Mount Oliver.
Beaver,	Prof. George Kennedy,	Beaver Falls.
Berks,	C. T. Fox,	Reading.
Bucks,	W. H. Moon,	Morrisville.
Butler,	J. W. Phillips,	Zelienople.
Carbon,	E. Bauer,	East Mauch Chunk.
Chester,	J. W. Pyle,	Willow Dale.
Clinton,	Joel A. Herr,	Cedar Springs.
Columbia,	J. K. Sharpless,	Catawissa.
Cumberland,	H. S. Rupp,	Shiremantown.
Dauphin,	Gabriel Hiester,	Harrisburg.
Delaware,	Joseph Lewis, Jr.,	Newtown Square.
Franklin,	Dr. B. L. Ryder,	Chambersburg.
Juniata,	J. E. Jamison,	McAlisterville.
Lancaster,	L. S. Reist,	Oregon.
Lebanon,	Bassler Boyer,	Lebanon.
Lehigh,	H. Leh,	Allentown.
Lycoming,	A. R. Sprout,	Picture Rocks.
Mifflin,	Henry Ort,	Lewistown.
Montgomery,	E. Satterthwait,	Jenkintown.
Northampton,	A. S. Shimer,	Redington.
Northumberland,	William Voris,	Pottsgrove.
Perry,	M. B. Eshleman,	Newport.
Philadelphia,	A. W. Harrison,	108 Queen street, Germantown.
Schuylkill,	J. S. Keller,	Orwigsburg.
Union,	A. S. Sheller,	Lewisburg.
York,	Peter Lint,	York.

COMMITTEE ON NOMENCLATURE.

H. A. Chase, *Chairman*, Philadelphia.
J. Hibberd Bartram, Chester county.
S. W. Noble, Montgomery county.
H. A. Longsdorf, Cumberland county.
J. T. Smith, Juniata county.

COMMITTEE ON ENTOMOLOGY.

S. S. Rathvon, *Chairman*, Lancaster co.
Ezra High, Berks county.
Herman Strecker, Berks county.

COMMITTEE ON ORCHARDING.

Thomas M. Harvey, *Chairman*, Chester county,
J. G. Engle, Lancaster county.
Jacob Heyser, Franklin county.
Col. Geo. F. McFarland, Juniata county.
H. C. Snavely, Lebanon county.

COMMITTEE ON FLORICULTURE AND ARBORICULTURE.

Charles H. Miller, *Chairman*, Philadelphia.
P. C. Hiller, Lancaster county.
John C. Hepler, Berks county.
George Achelis, Chester county.
W. P. Brinton, Lancaster county.

COMMITTEE ON ARRANGEMENT AND RECEPTION.

C. T. Fox, *Chairman*, Berks county.
John C. Hepler, Berks county.
E. B. Engle, Franklin county.

LIFE MEMBERS.

Bartram, J. Hibberd, Milltown, Chester county.
Brinton, W. P., Christiana, Lancaster county.
Bissell, W. S., Pittsburgh.
Calder, Rev. James, Harrisburg, Dauphin county.
Cornelius, Robert, Philadelphia.
Engle, J. G., Marietta, Lancaster county.
Engle, H. M., Marietta, Lancaster county.
Engle, E. B., Waynesboro', Franklin county.
Garretson, Joel V., Flora Dale, Adams county.
Hayes, Charles P., 149 North Fifteenth street, Philadelphia.
Heyser, Jacob, Chambersburg, Franklin county.
Hildrup, W. T., Harrisburg, Dauphin county.
Hacker, William, Philadelphia.
Hoopes, Josiah, West Chester, Chester county.
Hiller, Casper, Conestoga, Lancaster county.
Hiller, Peter C., Conestoga, Lancaster county.
Landis, Israel, Lancaster, Lancaster county.
Martin, J. O., Mercersburg, Franklin county.
Pannebaker, William M., Lewistown, Mifflin county.
Reist, Peter S., Lititz, Lancaster county.
Shaffner, Jacob, Harrisburg, Dauphin county.
Swift, E. P., Mount Oliver, Allegheny county.
Thomas, George B., West Chester, Chester county.

HONORARY MEMBERS.

Barry, P., Rochester, N. Y.
Downing, Charles, Newburg, N. Y.
Ellwanger, George, Rochester, N. Y.
Garber, J. B., Columbia, Lancaster county, Pa.
Meehan, Thomas, Germantown, Pa.
Michener, Dr. E., Toughkenamon, Chester county, Pa.
Parsons, S. B., Flushing, N. Y.
Parry, William, Parry, N. J.
Rathvon, Prof. S. S., Lancaster.
Rowe, Hon. D. Watson, Chambersburg, Pa.
Rutter, John, West Chester, Pa.
Saunders, William, Washington, D. C.
Thomas, John J., Union Springs, N. Y.
Warder, Dr. John A., North Bend, Ohio.
Willets, Rev. Dr., Philadelphia.
Wilder, Hon. M. P., Boston, Mass.
Wickersham, Dr. J. P., Lancaster, Pa.

ANNUAL MEMBERS.

Achelis, George, West Chester.
Balderston, Geo, Colora, Cecil county, Md.
Bauer, Elwin, East Mauch Chunk.
Biddle, F. C., Chadd's Ford, Delaware county.
Boyer, Bassler, Lebanon.
Brandt, Dr. E. B., Mechanicsburg.
Branson, David H., Atglen, Chester county.
Breneiser, Charles, Reading.
Brindle, A. C., Mechanicsburg.
Brosius, William H., Liberty Square, Lancaster county.
Carter, John I., West Grove.
Chaapel, Harry, Williamsport, Lycoming county.
Chase, Howard A., 2 South Merrick street, Philadelphia.
Chase, R. G., Geneva, N. Y.
Clark, Hamilton T., Catawissa.
Cocklin, E. H., Bowmansdale, Cumberland county.
Cocklin, Jacob, Shepherdstown, Cumberland county.
Cooper, Calvin, Bird-in-Hand.
Crawford, Matthew, Cuyahoga Falls, Ohio.
Darlington, R. S., West Chester.
Davis, E. M., 205 Walnut Place, Philadelphia.
Davis, Edwin, Thompsontown.
Diffenderfer, F. R., Lancaster.
Eby, Simon P., Lancaster.
Edge, Thomas J., London Grove, Chester county.
Engle, Daniel G., Marietta, Lancaster county.
Epler, John H., Conewago, Lancaster county.
Eppihimer, Henry, Reading.
Erb, John B., Lampeter, Lancaster county.
Eshleman, Milton B., Newport, Perry county.
Fox, Cyrus T., Reading.
Fretz, A., Kreidersville.
Funk, J. H., Boyertown.
Geiger, M. Z., Geiger's Mills.
Gerhart, Dr. T. S., Beckersville.
Greene, Dr. C. A., Harrisburg.
Greenleaf, R. P., M. D., Henry Clay, Del.
Greth, A. C., Reading.
Greist, Jesse W., Flora Dale, Adams county.
Griesemer, C. A. Z., Reading.
Gross, D. W., Harrisburg.
Grover, Leverett, 412 Nineteenth street, Philadelphia.
Gutshall, Col. John, Carlisle.
Haines, Henry C., Germantown.
Haines, John S., Germantown.
Harrison, A. W., 108 Queen street, Germantown.
Hart, Lane S., Harrisburg.
Harvey, Thomas M., West Grove, Chester county.
Heiges, S. B., Shippensburg.
Hepler, John C., Reading.
Herbein, Dr. J. S., Sinking Spring.
Herr, Joel A., Cedar Springs, Clinton co.
Herr, Daniel D., Lancaster.
Hershey, Simon A., Landisville.
Hershey, W. L., Landisville.
Hertzler, S. M., Eberly's Mills, Cumberland county.
Hiester, Charles E., Harrisburg.
Hiester, Gabriel, Harrisburg.
High, Ezra, Reading.
Hoopes, Abner, West Chester.
Hostetter, H. F., Oregon, Lancaster county.
Huber, John, Lititz, Lancaster county.
Jameson, James, Reading.
Jamison, J. E., McAlisterville, Juniata co.
Keim, Isaac W., Reading.
Keller, J. S., Orwigsburg, Schuylkill co.
Kendig, M. D., Cresswell, Lancaster co.
Kennedy, Prof. George, Beaver Falls.
Knabb, Jacob, Reading.
Kready, John, Mount Joy.
Kreigh, J. S., Catawissa.
Krick, Henry B., Sinking Spring.
Leh, H., Allentown.
Leonard, Maurice, Oakland Mills.
Lewis, Joseph, junior, Newtown Square, Delaware county.

Linn, John, Chambersburg.
Lint, Peter, York.
Linville, J. C., Gap, Lancaster county.
Longsdorf, D. E., Mechanicsburg, Cumberland county.
Longsdorf, H. A., Mechanicsburg, Cumberland county.
Lorah, George K., Brumfieldville, Berks county.
Love, Thomas, South Bethlehem.
Marks, Levi, Reading.
Martin, W. J., Catawissa, Columbia county.
McFarland, J. Horace, Harrisburg.
McFarland, Colonel George F., McAlisterville, Juniata county.
McGowan, James, Geiger's Mills.
Meehan, Thos. P., Germantown.
Merceron, F. F., Catawissa.
Miller, Charles H., Mt. Airy, Philadelphia.
Mitchell, J. E., 310 York avenue, Philadelphia.
Moon, William H., Morrisville.
Mumma, J., Mechanicsburg, Cumberland county.
Mumma, Isaac, Highspire, Dauphin co.
Musser, Henry C., Schock's Mills, Lancaster county.
Nimson, C. H., Allentown.
Nissley, C. B., Mechanicsburg.
Noble, S. W., Jenkintown, Montgomery county.
Oberly, Erwin, Easton.
O'Neill, Edward, Bethlehem.
Ort, Henry, Lewistown, Mifflin county.
Ort, Mrs. Henry, Lewistown, Mifflin co.
Orth, John F., Reading.
Pardee, Ario, 2375 S. Third street, Philadelphia.
Phillips, J. W., Zelienople.
Pyle, J. W., Willow Dale, Chester county.
Rakestraw, Thomas, Willow Dale, Chester county.
Ralston, John, Reading.
Reeder, Hiram T., Catawissa.
Reist, Levi S., Oregon, Lancaster county.
Rife, Jacob L., West Fairview, Cumberland county.
Ritter, W. S., Reading.
Roberts, Rowland, Horsham.
Rupp, H. S., Shiremanstown, Cumberland county.
Rush, J. G., West Willow.
Ryder, B. L., Chambersburg.
Satterthwaite, E., Jenkintown, Montgomery county.
Scarlet, Levi, Christiana.
Sharpless, J. K., Catawissa.
Sheller, Alf. S., Lewisburg, Union county.
Shelly, Daniel, Shiremanstown, Cumberland county.
Sherfy, John L., Gettysburg, Adams co.
Shimer, A. S., Redington, Northampton county.
Shoemaker, R. C., Jarrettstown, Montgomery county.
Small, Samuel, junior, York.
Smith, Dr. A., Wernersville.
Smith, F. L., Reading.
Smith, Patrick, South Bethlehem.
Smith, J. T., McAlisterville, Juniata county.
Snavely, H. C., Lebanon, Lebanon county.
Sprout, A. R., Picture Rocks, Lycoming county.
Stitzel, George D., Reading.
Strode, A. Darlington, West Chester.
Swift, E. P., Mt. Oliver, Allegheny county.
Thomas, Joseph W., King of Prussia, Montgomery county.
Voris, William, Pottsgrove, Northumberland county.
Wagner, Henry, Reading.
Wanner, Peter D., Reading.
Wherry, S. M., Shippensburg, Cumberland county,
Whitner, George K., Reading.
Wickersham, R. A., Bendersville.
Willson, Geo. B., Lancaster.
Witmer, Joseph F., Paradise, Lancaster county.
Woods, T. A., Harrisburg.
Yates, David G., 5774 Germantown avenue, Philadelphia
Yoder, Joseph L., Bethlehem.
Young, John G. B., Reading.
Young, William, Reading.
Zeigler, Amos, Schock's Mills, Lancaster county.
Zerr, Jacob G., Geiger's Mills.
Zug, Allen W., Lititz.

STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

The twenty-sixth annual meeting of this Association was held in Eshleman's hall, Lancaster, Pa., January 21st and 22d, 1885. The regular attendance during the meeting was larger than usual, and the closing session of Thursday evening was made specially interesting by Professor Meehan's entertaining lecture, and the able discussion on "Horticulture in our Public Schools," by Dr. Wickersham and others.

A very pleasant and encouraging feature of the evening's entertainment was the presence of so many ladies, and a number of pupils of the boys' and girls' high schools of Lancaster city. Another most gratifying feature was the deep interest manifested by the press of Lancaster city in their full and prompt reports of our proceedings. It may be truthfully said that nowhere in the State of Pennsylvania has our Society been more cordially received, or had more generous attention from the press, than in the city of Lancaster.

The proceedings, discussions, &c., during the sessions, were interesting and practical, and are given in the following pages as full and complete as they could be made within the space allotted to this report. Special attention is called to the report of General Fruit Committee, through its efficient chairman, Cyrus T. Fox, of Reading. It is, by unanimous consent, the most complete and thorough paper of its kind ever submitted to our Society. The exhibition of fruits and flowers, though not so large as at some previous meetings, was unusually varied and attractive.

Several handsome specimens of Japan persimmons, contributed by H. C. Bristol, of Santa Barbara, Cal., and exhibited by D. E. Longsdorf, of Mechanicsburg, Pa., were upon the tables and attracted considerable attention. The roses and cut flowers, exhibited by A. D. Rohrer & Bro., and the pyramid of choice primroses, by H. S. Rupp, were greatly admired by all. John B. Erb, of Refton, exhibited some handsome designs of trees and evergreens used in a Christmas celebration at the Refton Sabbath-school. They were very artistically arranged and attracted much attention.

During the meeting the death of Charles Downing, an honorary member of our Society, and for years the leading pomologist in America, was announced, and appropriate resolutions were passed. Announcement was also made of the death of William L. Schaffer, of Philadelphia, who was, for many years, a member of our organization, and always manifested a deep interest in its welfare. Reading was elected as the place for our next annual meeting, and the Association adjourned, with many pleasant recollections of our meeting at Lancaster.

THE MEETING.

In the absence of President STITZEL, Vice President HOOPES called the Association to order at 11 o'clock.

Dr. WICKERSHAM introduced Mayor Rosenmiller, who heartily welcomed the Society to Lancaster, and accepted our visit as a compliment to the city. He said our organization was engaged in a noble work, and he hoped our stay would be pleasant, as he knew it must be interesting and profitable to those who would attend, and would result in great good to the horticultural interests of our State. He again cordially welcomed the Society to the hospitality of the city. Dr. Wickersham then introduced Hon. John H. Landis, president of the Agricultural and Horticultural Society of Lancaster County, who said:

Gentlemen of the State Horticultural Association of Pennsylvania:

In behalf of the citizens of the city and county of Lancaster, I take pleasure in extending to you a hearty welcome to this, the garden spot of Pennsylvania.

Our county, with its nine thousand splendid farms, containing nearly half a million acres of fertile soil, is the richest mine of agricultural wealth on this hemisphere. Of the twenty-seven hundred counties of this Union, there is not one that equals the old county of Lancaster, in the intrinsic value of its farm land. This position has been acquired and maintained by the energy, thrift, and industry of our people. While they have an established reputation for industry, sobriety, and frugality, they are no less noted for their hospitality. Hence, we take special pride in welcoming you to our county.

We, as a people, are students of horticulture, as well as of agriculture, and, while but a small percentage of our population may encourage you by their presence, I wish to assure you that they are deeply interested in the objects of your organization.

I wish you a pleasant time during your stay among us, and I trust that your deliberations will not only be pleasant and entertaining but be productive of much good. Again, gentlemen, in the name of the Lancaster County Agricultural and Horticultural Society, and the citizens of Lancaster county, I tender you a hearty welcome.

Mr. HOOPES. In the absence of our President, and in behalf of our Society, I thank you for these cordial words of welcome. We are not strangers here, however, as it was in this city, twenty-six years ago, that the first informal meeting was held that resulted in the organization of this body. We have met here several times since, and nowhere in our wanderings have we met with a more hearty welcome than in your city. I regret to say that the pleasure we anticipated here will have a tinge of sadness, in view of the death of Charles Downing, of Newburg, N. Y., the very foremost horticulturist of the land, and a man as kind-hearted and gentle as he was learned. There is no one to-day who can take his place, and I hope before our final adjournment, appropriate resolutions to his memory will be passed. Allow me again to thank you most heartily for the cordial welcome extended.

Roll-call of members having been dispensed with, the secretary read minutes of last annual meeting, which were adopted as read.

On motion of Mr. Moon, the appointment, by the Chair, of a committee of five on nominations was authorized, and the following were named: W. H. Moon, J. W. Pyle, Joseph F. Witmer, H. S. Rupp, Cyrus T. Fox.

Mr. Thomas, treasurer, submitted the following report, which was referred to an auditing committee consisting of E. Satterthwaite, W. P. Brinton, J. G. Engle, whose report is submitted herewith:

George B. Thomas, *Treasurer, in account with State Horticultural Association of Pennsylvania:*

1884.			*Dr.*
Jan. 15.	To cash on hand as per report, ...		$311 42
17.	To cash for annual dues of members, ...	$53 00	
	To cash life member, E. P. Swift,	10 00	
23 to June 30.	To cash for annual dues of members,	18 00	
			76 00
Oct. 29.	To cash from J. B. Rutherford, Treasurer, Pennsylvania State Agricultural Society, being amount awarded in premiums at State Fair, held in Philadelphia, . . .		100 00
			$487 42
1884.			*Cr.*
Jan. 16.	By cash paid George D. Stitzel, postage, &c., for 1883, ...	$1 50	
17.	By cash paid Edwin Satterthwaite, postage cards and printing for Chairman General Fruit Committee,	1 25	
	By cash paid Oscar P. Adams, for services as janitor, ...	5 00	
	By cash paid E. B. Engle, express on reports, postage, and printing,	17 55	
	By cash paid E. B. Engle, secretary, as salary,	25 00	
25.	By cash paid F. S. Hickman, for furnishing and printing one hundred postal cards for acknowledging receipt of members' annual dues,	2 00	
			$52 30
	By balance, ...		435 12
			$487 42
1885.			
Jan. 21.	By cash on hand in Farmers' National Bank of West Chester, ...		$435 12

To the President and Members of the State Horticultural Association of Pennsylvania:

The undersigned, your committee appointed to examine the report and vouchers of George B. Thomas, Treasurer of the Association, respectfully beg leave to report:

That having examined the account, and having compared it with the vouchers, find every charge proper, and approved by the officers, and the balance reported is the actual balance remaining in his hands due the Society.

All of which is respectfully submitted.

(Signed) E. Satterthwaite,
W. P. Brinton,
J. G. Engle.

After reading his report, Mr. Thomas stated that four additional awards of ten dollars each had been made to our Association by the State Agricultural Society. Not having been aware of these awards, no application had been made for them, but upon his return home, after our adjournment, he would correspond with the proper parties in reference thereto.

Reports of Special Committees.

Mr. **CHASE.** As chairman of committee appointed to prepare a list of fruits for Pennsylvania, I would state that the report is ready and will be presented at our afternoon session.

Mr. **SATTERTHWAITE.** I received a letter several days since from Pesident Stitzel asking me to make a report on our exhibit at the State Fair. As a member of the committee appointed to make an exhibit, I regret to say that I am not prepared to do more than give a brief verbal report. I can safely say we had a successful exhibit. Many of our members made creditable displays, and I hope a more detailed report will be prepared for publication in our proceedings.

Mr. **MOON.** I am sorry Mr. Satterthwaite's modesty prevented him from referring to his own exhibit at the State Fair, which occupied about half the entire available space devoted to fruits. I know there was an account in detail, of the number of plates exhibited, but it was handed to the secretary of the State Agricultural Society. I hope, that as we have met with so much encouragement this year, these exhibits will be continued.

Mr. **HOOPES.** I hope a full report will be prepared and sent to the Secretary for publication.

Mr. **ENGLE.** I was a member of the committee to arrange for exhibit, but was obliged to leave before the Fair closed. I am sorry we have no record of the number of plates exhibited.

Mr. **SATTERTHWAITE.** I find in our report for 1884, which has just been issued, there is published a paper that was not read at our last meeting, and was therefore not properly a part of our proceedings. I refer to the article on "Yellows," by John Rutter, of West Chester, which was evidently prepared with the idea of refuting some assertions made by me on the same subject several years ago. I have not had time to read his paper, and do not know exactly to what he refers, but he evidently intends to be very severe. I think no paper of this kind should be published in our reports unless the member referred to be given an opportunity to reply. I certainly would have attempted a reply at our last meeting had I known the contents of Mr. Rutter's article.

Mr. **THOMAS.** Papers containing personal matter should be read before the Society, before being published in our proceedings.

Mr. **CHASE.** If I recall the circumstances correctly, the paper referred to was long, and our time being limited, it was ordered to be printed without being read. I think therefore the responsibility is with the Society and not with the Secretary.

AFTERNOON SESSION.

Business was resumed at two o'clock, Vice President Engle in the chair.

Mr. HILLER. I have been urging, for several years, the advantages of a low situation for apple orchards, and I now wish to call attention to some specimens grown on such a location. I have here a Baldwin, grown about ten feet from a small rivulet, which is not over eighteen inches below the level of the surrounding soil, and held its fruit well; and the only difficulty in keeping them was to keep them from being eaten. Some of the same variety, grown on high ground, were inferior in size and keeping qualities, and every specimen gone by October 1st. So, also, with Smoke-house; those grown on low ground kept well until April, while those from high ground did not keep at all. York Imperial on the hill-top were knotty and fell early. Dominie, on brick-clay soil, were good; on high, gravelly ground, poor and imperfect. I only wish to show how these apples keep when grown on low, damp soils, and that finer fruit can be grown, and with more certainty, than on high ground.

Mr. BALDERSTON. There are, doubtless, other reasons for these facts, as reported by Mr. Hiller. I spent some time recently in western New York, and noticed that apple trees were pruned back to a uniform height; that they bore immense crops of fruit, which kept well. I think they are usually gathered before fully ripe, and, while they keep better, they lack quality and flavor. It may be more profitable to grow them in this manner, but I would prefer to eat the fruit from high or upland ground.

Mr. JAMISON. Our best keeping variety is York Imperial, when grown on high land, but not on a northern exposure. Stagnant water will shorten the life of a tree and produce fruit of an inferior quality.

Mr. ENGLE. At our last annual meeting the following amendment to our constitution was adopted, and, under the rules, laid over for final action at this meeting:

"That the Executive Committee shall consist of all the elective officers of this Association, and that three of said committee (of which the President of the Society shall be one) shall constitute a quorum to transact any business relative to the interests of the Society."

I now move its adoption.

Mr. HOOPES. This amendment enlarges the Executive Committee, and will be more likely to provide a quorum. There are no special duties defined for the Executive Committee.

Mr. THOMAS. Article III of our by-laws authorizes the Executive Committee to select places for our annual meeting.

The amendment was unanimovsly adopted.

Adjourned.

CYRUS T. FOX, Chairman, then submitted his

REPORT OF GENERAL FRUIT COMMITTEE.

To the officers and members of the State Horticultural Association of Pennsylvania:

GENTLEMEN: The undersigned, chairman of the General Fruit Committee, would respectfully report that, having received notice of his appointment, he issued a circular on the third of last month, which was sent to the different members of the committee, requesting information in regard to the various crops of fruit and vegetables, and the results of observations and experiments made during the year 1884. Your chairman found that twenty-five counties of the State, including Philadelphia, were represented in the General Fruit Committee, comprising principally the territory east of the Allegheny mountains. For the purpose of obtaining reports from every section of the State, circulars were sent to well-known fruit-growers and horticulturists in every county of Pennsylvania, as well as to prominent members of the Association not members of the committee, the benefit of whose advice and experience was desired. There were responses from about one third of the gentleman addressed, and forty-two reports were received, representing thirty-three counties, or the principal fruit-producing districts of the State. A number of gentlemen expressed their regrets that they were unable to furnish any facts worthy of use. Several members of the committee failed to respond, and others sent in their reports so late that the compilation of the information received was delayed until within thirty-six hours of the meeting of the Association. From the mass of correspondence the following has been sifted as the horticultural results of the past year:

Apples.

The reports from the eastern section of the State show that there was a very large crop of this valuable fruit, and the quality was quite fair. Throughout central Pennsylvania and the mountain districts of the State, the yield was comparatively meager, and the fruit was of inferior quality, having been damaged by late spring frosts. In the western portion of the State the crop was a failure in many respects, owing to frosts in early summer and protracted drought in the latter part of the season. While the crop in Berks, Lehigh, Lebanon, Montgomery, Chester, and other counties in the south-eastern section of the State was extraordinarily large, the reports generally ascribe very poor keeping qualities to the fruit, and the cause is attributed to the great heat in September, which was the hottest September in thirty years. The apples ripened prematurely, and winter kinds became fall varieties. Great quantities of apples were converted into cider and vinegar, and the stock of the latter is the largest that has been manufactured in a long period. The premature dropping of fruit was general throughout the State. In many sections the usual ravages of the codling moth and borer are reported, while there was a conspicuous absence of the tent caterpillar.

Pears,

Where cultivated to any extent, were not below the average in yield, although 1884 was regarded as the "off year" for that excellent fruit. Some varieties, such as the Bartlett and Beurre d'Anjou, furnished a full crop, while other varieties did not do so well. The September drought caused a premature ripening of winter varieties, and also affected their keeping qualities. There was less fire blight than usual. Friend Satterthwaite, who is one of our most extensive pear-growers, raises good crops every season, and experiences no trouble from "off years." High culture is apparently the secret of his success. In Mifflin, and some other counties in the central and western portion of the State, the pear crop was a failure, and blight, frosts, and drought are given as the causes.

Peaches.

This crop was a comparative failure, except in certain favored localities. Where there was a full yield, the crop was injured by extreme drought, and the quality of the fruit was impaired. The cause of "yellows" remains as great a mystery as ever, but a majority of the correspondents agree that the best cure is to pull out the trees that are affected and destroy them. The climatic theory is entitled to much weight, especially as it is known that there are sections of the United States where the disease has never appeared. Our venerable friend, John Rutter, who has written a work on "The Culture and Diseases of the Peach," scouts the bacteria theories of some of the learned professors, and as he has furnished a valuable report in regard to his operations at his new home on the banks of the classic Susquehanna, and enlarges upon the "yellows," to which subject he has given great attention, it would be well to have his letter read for the benefit of the members of the Association. There is a great difference of opinion as to soil and exposure, but a majority recommend light soils and elevated situations for the successful cultivation of the peach.

Grapes.

The reports in regard to grapes differ materially, there having been a very good crop in some counties, while in other sections the crop was a failure. There is considerable complaint of uneven ripening, while the cause of failure is assigned, principally, to rot and mildew. On the favored hill-sides in the vicinity of Pittsburgh the crop was large and excellent, although late in maturing. The reports agree that of the numerous varieties of recent introduction there are very few worth retaining, and the Concord maintains its preëminence as the most desirable variety in existence for general purposes. The experience of correspondent Thomas M. Harvey, of Chester county, whose collection embraces over one hundred and fifty varieties, is that the Concord is worth more than all the rest. Among the more promising of the newer varieties he mentions the Brighton, Duchess, Pocklington, Moore's Early, and Niagara. The reports concerning the Brighton are uniformly good. The experience with the Niagara is not sufficient to warrant any definite conclusions.

Cherries.

It may be safely said that this is the most precarious fruit we have. When a large crop is indicated, wet weather about the ripening time will cause almost total failure. In some sections of the State the crop last year was quite good, better, in fact, than had been realized for some years; the sweet varieties were more prone to rot, while varieties of the Early Richmond class were entirely healthy. Through the central portion of the State the crop was very poor, while in the western counties, especially in the vicinity of Pittsburgh, there was an abundant crop of standard varieties. A preference is given by most correspondents to the Early Richmond as one of the most successful kinds that can be grown.

Plums.

Owing to the ravages of the curculio very little attention is paid to this crop, and in many sections no attempt to cultivate them has been made for years. Nevertheless some good results last year have been reported. Ex-President Hoopes, of West Chester, says that the crop in his neighborhood was very large and perfect, and refers to the importance of jarring the trees as an off-set to the operations of the curculio. A curculio-proof variety has not yet been found, although the "Wild Goose" and others of the Chickasaw species were recommended a few years ago with a great flourish of trumpets as possessing that characteristic. The trouble that many growers have had with the Wild Goose variety is that it blossoms profusely but never bears. This is probably owing to the fact that inferior seedlings have sprung from the "Wild Goose," and been sold for the original variety, until very few pure stocks of the original are to be found. The reports in regard to the Chickasaw varieties show them to be hardy, productive, and less affected by the curculio, and as this species hybridizes readily with other branches of the Prunus family, a vast and promising field is open to the experimenter. From all parts of the State there are very favorable reports as to the Lombard and Richland, which are said to succeed best, and to better withstand the attack of the curculio. While the cultivation of plums has been to a great extent abandoned, the statement is still more applicable to apricots and nectarines, which are rarely grown except in well-protected situations in town lots, and it is not likely that they will ever be profitably produced for market in this State.

Quinces.

This fruit was inadvertently omitted in the list of queries submitted to the correspondents, although perhaps covered by the general question in conclusion. Reports, however, were received from a number of counties showing that the quince crop was abundant and the specimens were perfect. Those who had a number of trees realized handsomely, as quinces always command a remunerative price. For jellies and preserves they rank with the choicest of our domestic fruits, and, although generally commanding twice the price of apples, housekeepers in our cities complain that they are always scarce. As a quince orchard will last forty years, and the trees come early into bearing, the cultivation of the quince can be made a paying industry. Rea's Mammoth, the Orange and Champion are the varieties most generally recommended.

Small Fruits.

The crop of small fruits was up to the average, and the prices as a rule compensated the growers amply. More attention is paid to small fruits, although some correspondents report that in their counties the subject is given but little heed, and, except as to strawberries, dependence is placed entirely upon the crop of wild fruit. There was a large crop of strawberries, except in a few localities, and the Sharpless, Charles Downing, Cumberland, and Crescent Seedling are the varieties most prominently mentioned. Mr. Satterthwaite, who, owing to his nearness to the Philadelphia markets, is well qualified to judge of the wants of growers, places his main reliance upon the Mt. Vernon. J. S. Keller, of Orwigsburg, claims that his new variety, "Keller's Seedling," bore every month during the summer and fall, and was less affected by drought than the older sorts. An improvement is wanted in raspberries. The Cuthbert is highly spoken of by several correspondents. Very little attention is given to blackberries, currants, and gooseberries. Those who grow blackberries for market find them to be one of the most profitable crops that can be raised.

Vegetables.

The title of the Pennsylvania Fruit Growers' Society having been changed to State Horticultural Association of Pennsylvania, the observations of the General Fruit Committee were very properly extended so as to embrace the products of the garden. From many of the counties reports came that vegetables are not grown to any considerable extent. Most farmers grow only sufficient for their own use, and many excellent vegetables, which are found in city markets, are unknown to them. It is lamentable that farmers are not more interested in this branch of horticulture. With an abundance of vegetables on hand, a family will not be so disposed to run into the error, very common in this country, of eating meat in a proportion too great for the proper maintenance of health. Many farmers are satisfied if they are able to put away a sufficient supply of cabbage and potatoes for the winter, and they ignore some of the most delicious vegetables on the score that they have no time to attend to them. Now a great deal can be done in odd intervals, which might otherwise, perchance, be consumed in needless loitering. The boy on the farm can imbibe a love for his work by undergoing an apprenticeship in the kitchen-garden, and the men and the boys together can make a success of this department without calling upon the females of the household to whom this labor is frequently relegated. Farmers in the vicinity of large cities are making truck-growing pay, and as they acquire experience they will find that with proper management and under favorable condition, an acre of ground can often be made to produce larger profits than many a hundred-acre farm slovenly conducted. The reports in regard to vegetables last year are very favorable, although in some localities the yield was curtailed by drought. Very little has been said in reference to new varieties. Of the numerous acquisitions to the potato list none have supplanted the Early Rose for general early crop. Burbank's Seedling is mentioned by several correspondents as producing the best results in their respective localities. Henderson's White Plume celery was given a thorough trial, and while some are loud in its praise others have not found it adapted to their soils and localities. The old standard varieties of vegetables still succeed the best, and, although myriads of novelties are now flooding the market, many of them are worthless.

A cultivation of a taste for flowers and house adornment should also be one of the objects of a horticultural association. What a charm there is about a country home with a dooryard beautiful with flowers, ornamental shrubbery and plants, and how strong must be the attachment of a boy for such a home. To keep the boy on the farm, and cause him to take a deep interest in agricultural and horticultural pursuits make home and its surroundings beautiful. Floriculture is peculiarly calculated for the amusement of youth, and may teach them many important lessons, among which may be mentioned neatness, and the cultivation of a correct taste. The mind is also furnished with many pleasing ideas, and is thereby taught to "look through nature up to nature's God." Of late years farmers have commenced to construct green-houses upon their premises, and they find profit in propagating plants for sale to their neighbors. The raising of flowers for sale belongs to the professional florist, as farmers are not prepared to give that degree of attention to this branch of horticulture which it requires. The growing demand for flowers in the large cities for decorative purposes, and the charming change in conventional customs of making gifts of flowers upon anniversary occasions, instead of articles of a meaningless character, have together resulted in greatly increasing the florist's profit.

In relation to general observations upon fruit culture, as deduced from the numerous reports received by your chairman, it may be stated that the horticulturist has no reason to feel disheartened by reason of failure, or on account of adverse causes of any kind. A large crop is not always the most profitable. The apple crop, for instance, was so abundant last year in the writer's county, that farmers sold them at 10 cents per bushel in the orchards, the purchaser to attend to the picking. On the fruit farm of John C. Hepler, in the city of Reading, 800 bushels of apples were produced on three acres of land, and on the farm of R. W. Scherer, in Oley township, this county, trees bore from 60 to 70 bushels of apples each, and hundreds of bushels went to waste. Mr. Scherer, in order to stimulate some Baldwin trees which never bore, although planted over twenty years, gave them a liberal application of ashes, and the result was an astonishing yield of fruit. It may be remarked that many an orchard, otherwise healthy, is unproductive because the trees are literally starved, as there is not sufficient nutriment of the right kind in the soil to enable them to produce fruit. Apples are retailing in the Reading markets at 8 to 10 cents per half peck in the middle of January, and are delivered to grocers by farmers at 60 cents per bushel. The writer saw apples selling at 60 cents per barrel in the city of Buffalo in the middle of last October, and choice picked fruit was delivered at canning establishments for 80 cents to $1 00 per barrel.

Quality is being appreciated more than formerly, and large, showy fruit is preferred. In a very productive season the fruit does not attain the same size and perfection as when the trees bear moderately. The Concord contiues to be one of the most salable grapes, because its size, appearance and other good qualities commend it. The Sharpless is one of the most profitable strawberries because its size secures 25 to 50 per cent. more cash than can be obtained for smaller varieties. It is the size of the cultivated blackberry that cause it to bring thrice the sum paid for its wild brother of the hills. There is a gradual improvement in public taste, and the better sorts will continue to command extra prices. Hence it remains for the fruit-grower to ascertain what will best suit his market.

As to varieties, it is not well to run to too many kinds if profit is to be the measure of success. The most successful fruit-growers of Berks county, Messrs. Christopher and Solomon Shearer, have only comparatively few varieties of each kind of fruit. They are brothers, and the latter has nearly five hundred acres, at Vinemont, devoted to fruit. Being asked to furnish a list of the best varieties of fruit, for both family and market purposes, he gave the following as the result of many years' experience: Apples—Red Astrachan for summer, Alexander and Porter for autumn, and Baldwin, Hubbardston's Nonsuch, Jonathan, and Winesap for winter; Pears—Bartlett for summer, Seckel for autumn, Beurre d'Anjou for late autumn, and Dana's Hovey for winter; Cherries—Belle de Choisy and May Duke; Peach—Crawford's Early, Crawford's Late, Early Rivers, Foster, and Old Mixon Free; Grapes—Worden. Of the berry fruits he recommends the following: Strawberries—Sharpless, Cresent Seedling, Charles Downing, Cumberland Triumph, and Miner's Prolific; Raspberries—Brandywine, Cuthbert, Doolittle, and Gregg; Blackberries—Kittatinny. At a discussion at one of the monthly meetings of the Berks County Agricultural Society, the different varieties, advocated as being worthy of recognition, comprised only thirteen of apples, seven of pears, and ten of peaches. Of several hundred varieties of grapes, the Hon. Marshall P. Wilder, who has made a specialty of the subject for many years, is reported as having expressed himself in favor of only the following kinds as possessing valuable characteristics: Moore's Early, Worden, and Early Victor as early varieties; Concord, Delaware, Brighton, Barry, Lindley, and Wilder as well established varieties, and Martha, Lady, Prentiss, and Pocklington as white varieties. The venerable Charles Downing, who has for years been recognized as the leading authority on pomology, has pronounced in favor of Fanny as the best summer apple; the Fall Pippin as the most desirable fall apple for all purposes; and Hubbardston's Nonsuch as the most perfect apple of its season. He also recommends the Bartlett as the best summer pear for general use. Beurre Bosc for fall, and Dana's Hovey for winter.

A number of correspondents report an increased planting of fruit trees, vines, etc. Greater attention is also being paid to varieties of native origin. In Berks county, the most certain crops are obtained from trees that originated in the county, such as the Krauser, and Keim, or from natives of the adjoining counties, as the Fallawater, and Smoke-house. Most winter apples of northern origin usually prove fall varieties in Pennsylvania, a truth which should be borne in mind when planting an orchard. One correspondent very sensibly writes that "new varieties of fruit are seldom as good as represented by tree agents, although their prices are good."

It is necessary that fruit-growers should possess energy, perseverance and good judgment. The codling moth, borer, yellows, and other enemies will be encountered every year, but, without the sweat of his brow, man has nothing, and to succeed he must be prepared to wage a relentless war against all destructive foes. Unfavorable and changeable weather may destroy one crop, but others will be left, and will bring more remunerative prices than if all were to succeed. It rarely happens that all crops are a failure in the same year. If insects are more numerous than in former years, it will require more care and labor to prevent their encroachments, and the modern methods of destroying them seem to be successful. In the southern portion of Berks county fifty thousand peach trees have been destroyed by the yellows, but this wholesale visitation has not deterred others from planting orchards, and locations have been found apparently exempt from the disease. The importance of good cultivation is generally overlooked. Where one grower meets with failure, his neighbor may have remarkable success, and this is not usually the result of luck, but of painstaking care, and the exercise of good judgment.

The unprecedented low figure of wheat and the small grains is one of the marvels of the age. Wheat has not been so low in the great markets of the world for over a century. Corn is also very low in price, and farmers distant from the market find it economical to burn it as a fuel rather than send it east. The farming class is impoverished by this excessive cheapness, while consumers in the large cities do not get the benefit of the low price, as the baker adds very little to the size of his loaf, while charging the old price for it. Owing to the depreciation in the value of cereals, the farmers of the east will be more likely to devote their attention to the raising of fruit, vegetables, and products of the soil more salable and remunerative than wheat. Should there be a surplus of fruit and vegetables in the years to come—which is not likely to happen, as the increasing population of the cities will readily consume all that is offered—the question of what shall be done with the surplus must be solved by the evaporator and the cannery. An acquaintance who could not dispose of his immense crop of apples at any price, purchased, at the writer's suggestion, an evaporator which a twelve-year-old daughter was able to operate, and saved large quantities of fruit from spoiling. The evaporated product is being rapidly disposed of this winter, and is bringing in handsome returns.

Within a few years the canning business of this country has developed to a remarkable extent. Canning establishments have multiplied, and thousands of cases of fruits and vegetables are put up where hundreds were formerly deemed sufficient to supply the trade. Canned goods are now so low, that they are no longer regarded by the poorer classes as luxuries. Even at the present low prices, there is a handsome profit in the business. An immense canning industry has developed in western New York, and, in certain localities in that State, the tillers of the soil are directing their sole attention to raising vegetables and small fruits for the canneries. In this connection, it may be stated that the glass jar is destined, ultimately, to take the place of the tin can, and whoever starts earliest in the enterprise will make a fortune. Thousands who are now afraid to buy eatables put up in tin cans, will not hesitate when they can get them in glass jars. The occurrence of several cases of poisoning lately, from eating canned tomatoes, has called attention to the danger lurking in the ordinary tin can. Whether it is the effect of the acid eating away the tin, or the poison from the soldering, opinions, just as is the case in regard to peach yellows, differ; but certain it is that the bad effects come either from one or the other cause, or from both.

In conclusion, it may be stated that the outlook for the future is not discouraging. It is too early to make any prediction as to the fruit crop of 1885, but, so far as the writer has been able to ascertain, the extremely cold weather experienced at the beginning of winter has not damaged the tender wood of last year's growth, and the fruit buds remain intact. In the West, however, where the mercury descended much lower than east of the mountains, great damage was done. Advices have been received indicating that the fruit crop this year in the West may prove an entire failure, and that fruit buds have been frozen in Missouri, Kentucky, and Tennessee, where this has never happened before. Telegrams also just received from the peach-growing sections along both sides of the Hudson valley in the State of New York show that there will be no peaches gathered during the summer and fall of 1885; and that the failure will prove to be the worst on record since peach culture became a regular business in that part of the State. Your chairman is much indebted to the members of the General Fruit Committee for the very full information contained in their reports, which, together with personal observations of the writer, made during the growing season in many sections of the State, have greatly facilitated the preparation of this report, which, it is hoped, may not have wearied the members of this Association. Many of the sub-reports contain excellent suggestions, and it would be well to refer all of them to a committee as to the future disposition to be made of them.

Respectfully submitted.

CYRUS T. FOX,
Chairman General Fruit Committee.

READING, PA., *January 20, 1885.*

MR. HOOPES. I move a vote of thanks to Mr. Fox for his very able report, and for the great care and time devoted in its preparation.

Unanimously adopted.

MR. SATTERTHWAITE. While the report just read is by far the ablest and most complete that has ever been presented to this Society, there are several points in it that it would not be proper to pass over without some remarks. The excellence of the report will make it dangerous, particularly in list of apples which are recommended by such high authority. In fruit-growing the question of varieties is most important, and it is absolutely necessary to know what varieties are best adapted to the locality in which they are to be planted. Some apples succeed admirably in one location, and are utterly worthless in another. Mr. Scherer recommends some half-dozen kinds, not one of which is of any value in our county. Neither are any of the three varieties of apples named by Charles Downing, as being the best of their respective seasons, of any value with me. I see some recommend Red Astrachan, than which nothing could be more worthless, unless it be Alexander, which is most scrubby and worthless of all. No variety of fruit is so local as the apple. Strawberries are also very local, while pears and peaches adapt themselves to more general cultivation.

Mr. **Hiller.** Mr. Satterthwaite's remarks are well taken. We must learn from observation and experience what varieties are best adapted to our several localities, and it is difficult to advise others what to plant. York Imperial and Smith's Cider seem best adapted for general cultivation in this State.

Mr. **Hoopes.** The only safe guide is to watch the fruit in our own neighborhood, and plant such varieties as succeed best. I am surprised to hear B. de Choisy cherry recommended. With me it will not bear at all.

Mr. **Fox.** The report of General Fruit Committee does not recommend any special varieties, but merely seeks to give the opinions of fruit-growers in different sections of the State as to what varieties succeed best in their respective localities. Some recommend only a few varieties, others more; depending upon their success with varieties tested. We must learn by practical experience what varieties do best, and be governed accordingly.

Mr. H. A. **Longsdorf.** The most difficult question is to know what varieties to plant. Experience is our only teacher. It is impossible to experiment with a long list of varieties, and we should learn what kinds not to plant. For planting in our State we need not have over twenty or twenty-five varieties, and it is folly to go to Russia, or even out of our own latitude, to secure such varieties as will succeed here. We don't need imported varieties; our own will stand our winters, and are as good in quality. Much intelligent and useful work can be done in developing the fruit resources of our own State.

L. S. **Reist.** I have planted five different orchards, in different soils, in the last twenty-five years. On a gravelly soil, bordering on wet ground, I planted Pennsylvania Red-streak, King, Northern Spy, and Newtown Pippin, and all failed except Red-streak. On a southern slope, on gravel soil, I planted Baldwin, Pound, Pennsylvania Red-streak, and Northern Spy. In this orchard Pennsylvania Red-streak did no good at all. These two orchards were within calling distance of each other. Among the best and surest bearers were Red-streak, Fallawater, and Smith's Cider; and red shale soil, on a southern slope, gave most satisfactory results, King of Tompkins County was poorest bearer of all. Had trees twenty years old that never bore a peck; am expecting Ben Davis to do well. It requires the experience of a life-time to know what varieties to plant or reject.

Mr. **Lint.** My experience is that red shale and flint gravel are best soils for almost any fruit, and certainly for apples.

Dr. **Funk.** Give me ironstone, and the rest may have all other soils. My place is the dividing line, and on ironstone soil apples bear well and live long, while on red shale they are a failure. Never, since I was a boy, did I know Red-streak to fail, and it is a fair keeper. Ben Davis promises well. Have trees eight years planted that are doing well. Hubbardston's Nonsuch, and Grimes' Golden are among my most profitable varieties; Krauser also does well, but is a poor shipper.

Mr. **Moon**. In Bucks county we raise the finest apples on "red shale." Of varieties, Hubbardston's Nonsuch is not of much account; Ben Davis is productive and promising; Smith's Cider is our leading variety.

Mr. **Jamison**. In our county apples do best on limestone. Rawle's Janet bears good crops of good quality and flavor; Smith's Cider is yet in its infancy with us; York Imperial does well on limestone soil, but on ironstone it is a failure.

Mr. **Davis**. One important fact has not been mentioned, and that is cultivation and fertilizers. This is as important as the kind of soil. If any element is deficient, it should be supplied; orchards are usually farmed on the starvation principle, and robbed of their fertility to produce other crops. My experience is, that thorough cultivation is one of the most essential points.

Dr. **Funk**. I wish to report an experiment with salt, as a fertilizer, that may be of interest. A gentleman had a quince tree, near his building, sixteen or eighteen years old, that never bore. One day he put a heaped half bushel of salt to the tree, which was washed in by a shower of rain. The next day another half-bushel was applied to the same tree; result—a heavy crop of the finest fruit.

Mr. **Hepler**. I have a young orchard that has not been plowed for twelve years, but I give it yearly a top dressing of barn-yard manure. I usually apply it in the fall, or any time during the winter. My trees usually have heavy crops.

Mr. **Meehan**. Among the many interesting features of the report of the General Fruit Committee, I was much impressed with that portion relating to plum culture. It is stated that some are abandoning this fruit on account of curculio. In other States the growing of plums is being made quite a success, and, where we formerly saw quarts of plums in the Philadelphia markets, we now find not only bushels, but hundreds of bushels; in fact, they are being offered almost as freely as peaches.

Fruit-growers are learning to fight the curculio more effectually every year, and find it pays to make an effort to save their crops. Jarring the trees with a hammer is the method principally resorted to in New York, and when the trees are large, jarring the branches with a pole is the better method. It would be rather discreditable to Pennsylvania fruit-growers to abandon plum culture, when growers in other states are succeeding so well. I really think it is about as profitable as any branch of fruit culture in which we can engage.

Mr. **Reist**. I am growing some plums which generally bloom profusely. Have used "Slug Shot" for curculio, and secured some fruit. A "neighbor who used nothing also had plenty of plums. There is a variety of plums grown near Ephrata which bears every year, and the fruit is gathered and sold by bushels. The trees are grown from suckers.

Mr. **Satterthwaite**. In our locality the trouble is not owing to curculio, but rot. Sweet cherries fail from the same cause. I have tried all the leading varieties of plums, and while they bear profusely, and some are stung by curculio, by far the greater portion are lost by rot. If you will tell us the cause, we can probably succeed in growing them. Plums have become plenty in our markets, and while some come from New York there are many places in Pennsylvania where they succeed well. I have also planted hundreds of sweet cherry-trees but very seldom succeed in saving any from the rot. Why this is, I do not understand, as they are very largely grown in some sections.

Mr. Fox. All my correspondents refer to the curculio as being the chief cause of failure in plum culture. Even Mr. Satterthwaite reports "curculio and rot" as the causes of failure. Correspondents from Beaver, Butler, Huntingdon, Lancaster, Lebanon, Mifflin, Cumberland, in fact from nearly every county as far as reported, report curculio as the one great difficulty in the way of plum culture.

Mr. Satterthwaite. Some years ago curculio destroyed our plums, but later we have far more trouble with rot.

Mr. Davis. Many trees in our county bloom profusely, but set no fruit.

Mr. Meehan. I grow fruits for experiment and information, rather than for market. Have planted about forty plum trees of as many different varieties. Had considerable trouble with rot, and tried different methods of saving the fruit. Tried burning tar under the trees, as suggested by Mr. Kauffman, of Iowa, but to no purpose. Three years ago I commenced jarring the branches, and since then they have not rotted, and have had plenty of plums. I never knew plums to rot unless stung by curculio, and I am satisfied there is no remedy so effectual as to catch them and destroy them. There is no variety "curculio proof." I saw in the mountains of North Carolina, plums of the Chickasaw type, all destroyed by this insect.

Mr. Satterthwaite. I ought to know whether a plum is stung or not, as I have been growing fruit for forty years. My remarks apply to plums *not* stung

Mr. Moon. I never knew plums to rot unless stung by curculio. On the red shale hill-sides in Bucks county plums do well.

Mr. Erb. I think there are instances where plums rot without being stung by curculio. Storms sometimes bruise the fruit and cause rot.

Mr. H. A. Longsdorf. Do not our plums rot because of tenderness imparted by high culture of the soil? This, in connection with wet, sultry weather; we almost invariably find but few rot in dry weather. Nearly all the plums and cherries in our county come from the poorer soil.

Mr. Lint. They also do better where the soil is not cultivated when in bearing.

D. E. Longsdorf. I found plums exceedingly plenty in Bedford county last fall, and there are many sections in our State where they can be grown successfully. The "Richland" seems to do best. I know, from my own observation, that plums will rot without being stung by curculio. Had a tree in my garden which I watched daily without any sign of the insect, and on which there was considerable rot. By thinning out, and keeping the fruit from contact with each other, I had a good crop. I find curculio can be kept away by tying something in the branches of the trees to scare them by continued motion and noise.

Mr. Rush. Last season I had a fine crop of plums, Imperial Gage and native varieties doing best. General Hand and German Prune are rather shy bearers. After the trees have set their fruit, I turn pigs and poultry among them, and have no trouble with curculio.

A LIST OF FRUITS FOR PENNSYLVANIA.

The Committee on Nomenclature, to which was referred at our last annual meeting, the question of a fruit list for our State, submitted the following report through its chairman, Mr. H. A. Chase, of Philadelphia:

Mr. President and Members of the State Horticultural Society: In attempting to make a list of the fruits that can be recommended for general cultivation in this State, we meet with many practical difficulties. The difference in soil, situation and elevation renders varieties of particular value in one section or one neighborhood of little or no value in others. Notwithstanding this, with the exception of winter apples, there is quite a list of fruits that are generally grown through the State, and in most neighborhoods constitute the leading and more desirable varieties.

In making this report, the attempt has been made to give, not an extended list comprising all of the varieties that it is possible to grow in the State, but a list of sorts that in most situations, with ordinary care, will be likely to yield fair results. Doubtless some varieties have been dropped that can still be planted with profit, and others may be named that in some neighborhoods are of little value; but, as a whole, I trust that this will be a fair guide to planters throughout the States. If planters will supplement these lists with the experience of practical fruit-growers in their own neighborhood, I believe they will not go very far astray. There are many local varieties, some of them untried, and others, unnamed seedlings, that appear to be doing well at and near their places of origin; but I am unable to speak of many of these at this time.

In considering the question of varieties of winter apples we find that the section of the State, south-east of the Blue Ridge, comprising the counties of Bucks, Montgomery, Philadelphia, Delaware, Chester, Lancaster, York, Adams, Franklin, and the most of Dauphin, Lebanon and Berks, demands an almost entirely different list from the balance of the State; although I believe that planters in the south-western part of the State, in the counties of Bedford, Somerset, Westmoreland, Allegheny, Washington, Fayette, and Greene, would do well to experiment with the same varieties. I do not attempt to take the space that would be required to give a description of all the sorts named.

Apples.

Leading Summer Varieties:—Cornell's Fancy, Duchess of Oldenburg, Early Ripe, *Early Harvest, *Golden Sweet, Primate, Red Astrachan, *Sweet Bough.

Autumn Varieties:—Gravenstein, Maiden's Blush, Rambo, Smokehouse.

Winter Varieties:—(For the south-eastern and south-western parts of the State, as noted in the introduction), Ben Davis, Fallawater, Ridge Pippin, Smith's Cider, Winesap, York Imperial, York Stripe.

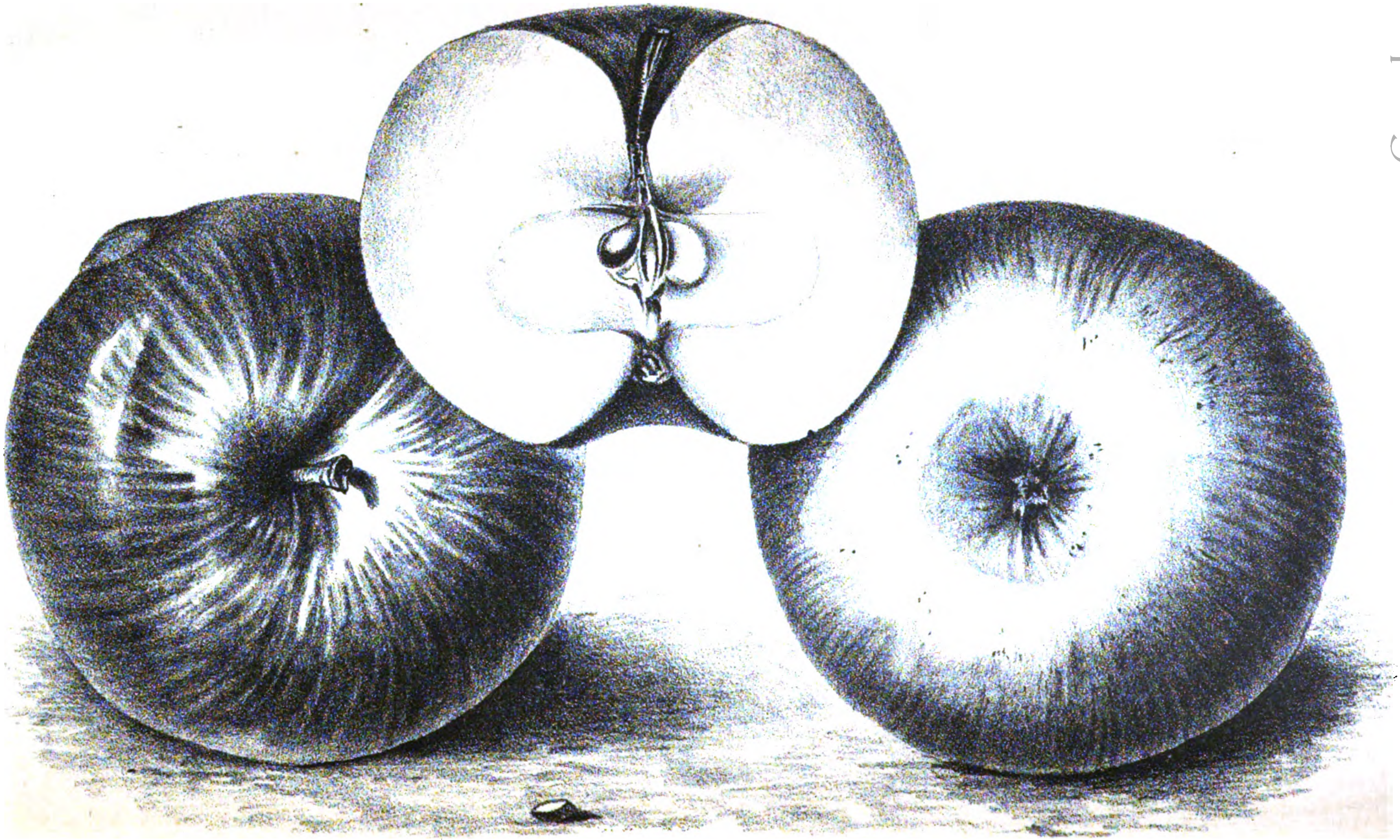
For the remainder of the State, I will add to the list of winter apples:—Baldwin, Hubbardston's Nonsuch, Grimes' Golden, Northern Spy, Talman Sweet, and possibly Rhode Island Greening.

In the south-eastern and south-western parts of the State, the Baldwin, and Rhode Island Greening are still profitably grown, in favorable localities, the usual requirements for their successful cultivation being an elevation of not less than five hundred feet above tide-water, and a north-eastern exposure.

The varieties that are starred I recommend for home use rather than for market. The Early Harvest cracks and spots badly in some neighborhoods, and is being largely superseded by Early Ripe. The Red Astrachan is also proving of little value with many. The Duchess of Oldenburg is a very profitable summer apple, but should not be allowed to ripen on the tree. Rambo, Smokehouse, and Fallawater are not doing as well as formerly, and are likely soon to be superseded by other sorts.

The following varieties, though not as yet generally tested, are of such great promise, and are doing so remarkably well in certain localities, that I do not hesitate to recommend their trial as experimental varieties:

Dickinson:—Fruit large, ovate, inclined to conic; yellow, striped and covered with red; flesh fine, crisp, juicy, mild sub-acid; tree a regular and



"CHEESE"

Origin, Lewisberry, York Co., Pa. Tree, vigorous, spreading, productive. An annual bearer. Fruit, medium to large. oblate; skin, greenish yellow, nearly covered with dull red. Flesh, fine-grained and tender. Sub-acid, good. November to March.

abundant bearer; raised in Chester county from seed of Yellow Bellefleur; season there from January to March.

Ewalt:—Fruit large, roundish approaching conic; clear, bright yellow, with shades of crimson in the sun; flesh white, tender, brisk sub-acid; a native of Bedford county; season November to January.

Stump:—Fruit medium, oblong; skin smooth, white, shaded and nearly covered with bright red; flesh white, tender, juicy, pleasant sub-acid; tree a remarkably vigorous grower, and an early and very abundant bearer; September.

Stark:—From Ohio, where it is valued as a long keeper and profitable market fruit. Large, roundish inclining to conic; greenish yellow, shaded, splashed and striped with red; flesh yellowish, a little coarse, moderately juicy; January to April.

Yellow Transparent:—A new Russian variety imported in 1870, by the Department of Agriculture, in Washington. The earliest ripening variety known. Tree a good grower, hardy, and an unusually early bearer; fruit good size, roundish oblate, and good quality; skin clear white at first, becoming a beautiful pale yellow when fully matured; ripens from ten days to two weeks before Early Harvest.

Pears.

With the exception of Duchess d'Angouleme and Louise Bonne de Jersey, I recommend the planting of standard trees rather than dwarfs. The following are the leading and most desirable varieties in our State.

Summer Varieties:—Bloodgood, Bartlett, Clapp's Favorite, Doyenne D'Ete, Manning's Elizabeth, Osband's Summer.

Autumn Varieties—Standards:—Doyenne Boussock, Howell, Seckel, Sheldon, Buerre de Anjou, Rutter.

Autumn Varieties—Dwarfs:—Duchesse d'Angouleme, Louise Bonne de Jersey.

Winter Varieties:—Dana's Hovey, Lawrence.

Kieffer probably should not be planted to any great extent north of the Blue Ridge; south of the Blue Ridge it is a very valuable pear. The trees require high culture, severe pruning, and the fruit should be thinned out if, as is frequently the case, it sets too thick upon the tree. In October, when the fruit begins to color, it should be gathered and ripened in the house.

I wish also to call particular attention to the Rutter. Like the Kieffer, it will stand high culture and severe heading in; but taking the State as a whole, I believe it to be our most valuable late autumn pear. I have it in bearing on the Pocono mountains, 1,500 feet above tide-water, and it ranks with the Bartlett in productiveness and early bearing.

The Flemish Beauty spots and cracks so badly as to be practically worthless.

Cherries.

Heart and Bigarreau Varieties:—The Hearts and Bigarreaus are rather of an uncertain crop, but the following I believe to be the most valuable: Black Eagle, Black Tartarian, Florence, Governor Wood, Ida, Napoleon, Smith's Bigarreau, Rockport Bigarreau.

Dukes and Morellos:—These cherries universally do well, and they are not as subject to rot as the sweet varieties. They are especially valuable for cooking and canning; Carnation, Early Richmond, Louis Phillipe, May Duke, Montmorency, Reine Hortense.

Plums.

The plum is decidedly an uncertain and in most neighborhoods an unprofitable crop in this State; yet there are a few favored sections, particularly among our mountain ranges, and red shale districts, where some varieties do very well. The following may be considered as the most promising to experiment with: Imperial Gage, Miner, Pond's Seedling, Richmond, Shropshire Damson, Lombard.

Quinces

Champion, Orange, and Rea's Mammoth.

Peaches.

I am not of those who consider that the day has gone by for the profitable cultivation of the peach in Pennsylvania. In those neighborhoods where the crop is uncertain, I advise a series of careful experiments in order to test the hardiness of the various varieties. I believe that a race of hardy peaches can be selected or developed—varieties that will thrive and yield fruit where many kinds are a failure. We have a notable illustration of what can be done in this direction, of careful selection of hardy varieties, with the apple, and while it cannot be carried as far with the peach, I am of the opinion that there is a field here for the patient and intelligent experimenter. The following may be regarded as the leading varieties: Alexander, Crawford's Early, Crawford's Late, Early Rivers, Large Early York, Mountain Rose, Old Mixon Free, Salway, Sener, Smock's Free, Stump, Wheatland, Wager, Waterloo.

Grapes.

In the extreme south-eastern part of the State, Concord is the most reliable variety, although many are successfully growing Agawam, Brighton, Moore's Early, Worden, Salem. The great enemies of successful grape-growing there are mildew and rot.

In the central and western part of the State, grapes generally do well. There is many an uncultivated hill-side that could profitably be devoted to grape-culture.

For a general list for the more favored grape-growing sections of our State, I will name: Agawam, (Rogers No. 15,) Brighton, Concord, Delaware, Empire State, Lady, Niagara, Martha, Moore's Early, Pocklington, Salem, Wilder, (Roger's No. 4,) Worden, Vergennes.

Currants.

The leading and most desirable sorts are Fay's Prolific, La Versailles, Queen, Red Dutch, Victoria, White Grape.

Gooseberries.

I recommend only the American varieties: Downing, Houghton, Smith's.

Raspberries.

There appears to be an awakening interest in raspberry culture, both for home use and for market. Within the past few years many new varieties of raspberries have been brought out, some of which appear to be a decided improvement on many of the old sorts. The following may be considered as the most desirable varieties:

Alden (Ohio.)—A black-cap, particularly valuable for evaporating and for home consumption; both hardy and productive; continues in use a long time.

Caroline, golden.—A beautiful yellow berry, of fine quality; too soft to ship, but valuable for home use and a near market; covers several weeks in ripening its crop.

Cuthbert, red.—A most valuable, late-ripening sort.

Gregg, black.—A good market berry; ripens rather late.

Hansell, red.—Extremely early; good quality; requires high culture.

Mammoth Cluster, black.—An old, reliable variety.

Reliance, red.—Productive and hardy; a reliable variety.

Rancocas, red.—Extremely early, and ripens its crop within a short time; a new and promising berry.

Turner, red.—Desirable for home use; excellent quality; too soft to ship.

Blackberries.

Early Harvest.—Fruit small, but its extreme earliness renders it a reliable variety.

Kittatinny.—A well-known Pennsylvania berry; rusts in some sections.

Snyder.—Hardy and extremely productive; medium in size.

Wilson's Early.—The leading berry in the Philadelphia market; too tender in some sections.

Wachusett Thornless.—This is the leading berry in central New England, and I believe it to be a berry of real merit, both for home use and the market; medium to large size; excellent quality.

Strawberries.

The following appear to be the favorites at the present time: Bidwell, Charles Downing, Cumberland Triumph, Jersey Queen, Manchester, Sharpless, Wilson, Mt. Vernon.

Mr. HARRISON. In recommending a list of apples, or more especially in planting for our own use, it is well to bear in mind that some varieties are good for one purpose and some for another; Bellefleur is considered best for jelly. Sweet apples for baking—Talman's Sweet, when properly baked, being unsurpassed in this respect. In peaches, also, there is much difference. My experience is, that Mixon Free is best of all for canning and general use. It is a large peach, handsome in appearance, and gives satisfaction for all purposes. It is one of the best varieties in our markets, and always in demand.

Mr. SATTERTHWAITE. The report just read is a very able one, and, if it is before the meeting, I will offer a few suggestions. The question of preparing a list of fruits which can be recommended for planting in our State, has frequently been discussed at our meetings. It would be difficult, in fact it would be impossible, to make a list that can be generally recommended for the State, and the best we can do is to suggest certain varieties for trial—as the chairman of our committee has done. Certain varieties do well everywhere, and should be in every collection, if only a few trees of a kind. This report should have our careful consideration, and if too late to take it up for general discussion now, I hope it will be considered more fully at our later sessions.

Mr. MOON. In New Jersey they have made a similar list, but arranged for different counties. They give, also, lists of those best adapted for family and for market purposes.

Mr. MEEHAN. The difficulty I see in preparing such a list is the conflicting or varying reports from different correspondents. Mr. Satterthwaite says Red Astrachan is worthless with him, while on my grounds, not over five miles distant, it is the last variety I would dispense with. Another illustration is the Rutter Pear, which Mr. Chase recommends as one of the best. I had it bearing four years, and while it bore well, the fruit was worthless. The past year it again had a full crop, and the fruit was of best quality. Most of us have had such experience, and it shows the difficulty in making a list that will be a safe guide for all.

Mr. McGOWAN. I think there are two kinds of Red Astrachan, one good, the other, worthless. I have the worthless variety, like Mr. Satterthwaite.

Mr. SATTERTHWAITE. I hope when this report is taken up for discussion it will be considered, in a systematic way, either for adoption or rejection. The question is one that should have been met by our Society long since. We have been meeting annually for twenty-five years, and yet have but little information as to what are the best varieties of fruit for our State. It should not be discussed in a rambling manner, but have careful consideration.

Mr. HOOPES. Mr. Chairman, this idea originated with you, and we will be pleased to have your suggestion as to what disposition shall be made of the report.

Mr. ENGLE. I did not suppose that a general list could be prepared for the State. Thought certain varieties could be recommended for certain districts. Probably we might as well continue the committee, but whatever is the wish of the Society, will be satisfactory to me.

Mr. MOON. I suggest that the matter be referred to a committee of five, who be requested to report before final adjournment.

Mr. JAMISON. This Association is made up chiefly of members from the eastern counties, and we cannot report for the western part of the State.

Mr. DAVIS. I move that a committee of five, of which the chairman of the Association shall be chairman, be appointed to consider what action is advisable in reference to this question, and report not later than Thursday afternoon.

The motion was adopted, and H. M. Engle, W. H. Moon, J. E. Jamison, H. A. Longsdorf, and Josiah Hoopes were named as composing said committee.

The following report of Committee on Insectivorous Birds was read by the Secretary;

Mr. PRESIDENT. Being reminded, some time ago, by our very efficient Secretary that there was a Committee on Insectivorous Birds appointed some two years ago, of which I stood on the record as chairman; and that the committee was expected to report at the coming Lancaster meeting. In casting back, I very vividly recollected a discussion at a meeting of the Society, some two years ago, on the mooted question in the case of the crimes and cruelties of the famous "English sparrow," ending, I believe, as usual, in nothing more definite than the appointment of a committee, and of that I had the honor of being appointed chairman; and, holding that position, I am, of course, chargeable for this long delay to report. This committee, I believe, was charged and enjoined to examine the law in regard to "Insectivorous Birds," and to report what modification, if any, would be advisable to relieve us of our great cause of complaint, which was principally centered in the destructive habits of the "English sparrow." It is quite in order, and emminently proper, that the Secretary of the Society should, at all times, remind delinquent members of committees of their neglected duties, and most especially was it so in this case; and is fully deserving the thanks of the chairman of this committee for the great leniency and forbearance exercised in the discharge of this delicate duty.

In tendering my thanks to the Society, I regret to say that any apology that I could offer would be of little avail, for it could scarcely be supported by a poor plausibility. With the *plea* of "*guilty*" from the chairman, the committee will just here unite, and proceed with their report. The committee, as some justification of their delay to report at an earlier day, recognizing that there is, and especially so in this case, much truth, as well as danger, in the old maxim "luck in leisure," as it is very patent that it applied here to relieve the committee of a long and labored report, in the collecting of facts and testimony in establishing the charges made against these insectivorous birds, to satisfy their numerous determined friends that sufficient ground existed upon which to ask a modification of the law placing them, or some of them, beyond its protection, and especially the one which led to the appointment of this committee, and which had been so long under trial in our "*Horticultural Court*," the "English sparrow." Of all this the committee has been relieved, solely on the principle of "luck in leisure," to which the maxim and your county should be entitled to *some credit*. The Legislature of the State, possessing the requisite information touching the depredations of these marauding foreigners on the interests of the garden and the field, took at once a step in advance, and anticipating us in all our labors, and in accord with the strong evidence adduced by the State Board of Agriculture, no doubt, responded in a modification of the law so far as to place this "foreign fraud," (the sparrow,) beyond the law's protection, making him at once what this committee could only have recommended to the law-making power—a wanderer in a foreign land, with no rights which even an American boy is bound to respect. He has been well and justly condemned, and that, too by the *three sovereign* powers of the old Keystone State, the *Legislative*, the *Judicial*, and the *Executive*. 1st. Legislative—Senate and House of Representatives; 2d. Our *State Board of Agriculture*, the *Supreme Court in like cases*, the *Judicial* power; 3d. The *Executive*, consisting of every spirited American boy in the State, who no doubt will look after him at seventy-five cents per dozen.

It is said that a *live mouse* is worth more than a "*dead lion*." This wise saying we have reversed already in the case of the "sparrow" epicurean taste, and an American boy's genius and aptitude have given this little feathered outlaw more *value* when *dead* than *alive*; in confirmation of this, the committee is supported by our watchful editor of the "Gardener's Monthly," who has informed the world through his wide-awake journal in his spicy, jocose way, to wit: "*Blissful ignorance!* In place of the famous reed bird Philadelphia epicures now have English sparrows imposed on them. If a fraud is pardonable it is surely here—a good fat sparrow is the equal of the reed bird every time. The boys think the sparrow is a great blessing and shower benisons on their introducer's head. The sparrow eats the fruit and seeds and is a little troublesome as well as a little useful; but reed bird on toast in the shape of a good fat sparrow pays for all." It is not only in this country that the English family have lawed themselves beyond the smooth edges of protection. In *Australia*, where he was doubtless transported with other convicts from his native land, (old England,) he has long ago called down upon his head the wrath of the government to his outlawry and death. The *Sunday Mail*, of *Sidney*, in 1881, says: "On Wednesday a deputation from the Agricultural Society and Chambers of Manufactures interviewed the chief secretary to ask him to introduce an act for the destruction of sparrows, and pending this, to appoint an "*Hon-*

orary Sparrow Board" to *prepare* and *distribute poisoned wheat*; and give advice. Mr. Bray would not promise to introduce a bill until it was known what action other Colonies had taken; *but* thought *a board might be appointed.* In further evidence of his depredations, we beg leave to turn the Society to the last report of the State Board of Agriculture of Pennsylvania, in which there will be found a mass of accumulative evidence of depredations in the wheat field. As the repealing law in reference to the English sparrow we think has fully allayed all accusations and complaints against insectivorous birds, the committee cannot see that there is anything further to investigate or recommend, they therefore ask to be discharged, hoping that our remaining insectivorous birds "to the manor born," may all so demean themselves as not to let the injuries they do to our gardens, fields, and orchards, in our fruits and grains, supersede the good they do in mitigating the ravages of our insect enemies.

Respectfully submitted.

J. RUTTER,
Chairman Committee

EVENING SESSION.

Having been called to order, report of the Auditing Committee was read and accepted.

The Committee on Nominations submitted the following list of candidates for the several offices:

President.—Calvin Cooper, Bird-in-hand.

Vice Presidents.—Josiah Hoopes, West Chester; H. M. Engle, Marietta; W. P. Bissell, Pittsburgh.

Recording Secretary.—E. B. Engle, Waynesboro'.

Corresponding Secretary.—W. P. Brinton, Christiana.

Treasurer.—George B. Thomas, West Chester.

Librarian.—Thos. J. Edge, Harrisburg.

Mr. THOMAS asked to be relieved of the treasurership, but the request was not granted.

Mr. COOPER. I think the committee has made a mistake in placing me at the head of their ticket. There are so many older and abler members in our Society, and I hope I will be excused.

Mr. HOOPES. An excellent nomination, and I do hope Mr. Cooper will regard the wishes of the Society. I move the Secretary be authorized to cast the ballot of the Society.

The motion was adopted, and the afore-named were declared duly elected.

The following additional officers were subsequently appointed by President Cooper:

Professor of Botany.—Thos. Meehan, Germantown.

Professor of Entomology.—S. S. Rathvon, Lancaster.

Professor of Horticultural Chemistry.—S. B. Heiges, Shippensburg.

A LIST OF FRUITS FOR PENNSYLVANIA.

Mr. HOOPES. In behalf of the committee of five, to whom this question was referred, I would state that it has been, for years, the desire and object of this Society to prepare a list of fruits which would serve as a guide to beginners in making a selection of varieties for orchard or garden. A member of this committee has a list for the State of New Jersey, giving the character of different kinds of fruit, and the varieties that do best in different counties, and they find it of decided advantage.

We have agreed to accept that as a basis. Each county represented by membership in our Association should submit a report through said member or members. These reports should not occupy the time of our annual meetings, but be arranged in committee, and the result announced at our next meeting. This is, in substance, the conclusion of our deliberations, and is submitted for approval or rejection.

On motion, the report was adopted.

ANNUAL ADDRESS OF THE PRESIDENT.

Mr. ENGLE. A few weeks ago, I received a letter from President Stitzel, informing me that business arrangements would prevent him from preparing the usual "annual address," and, probably, from attending the meeting at all. I have done the best I could under the circumstances, and, if nothing else is before the Society, I will now read what I have prepared.

FELLOW MEMBERS AND FRIENDS OF THE STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA:—Allow me to congratulate you on this, the twenty-sixth anniversary of this Association. Twenty-six years ago it was organized in this city. Since then it has not failed to hold annual and several intermediate meetings in different sections of the State. After laboring for a quarter of a century, more for public good than for its own aggrandizement, it returns to the city of its birth with a title that embraces a wider field of usefulness than when first organized. Then it was the "Fruit Growers' Society of Eastern Pennsylvania," now it is the "State Horticultural Association of Pennsylvania."

True, I see but few faces that were present at its organization, reminding us that some have gone the way of earth, but the ranks have been more than filled by new members, who seem to labor with as much enthusiasm in this noble cause as have those who are no more with us; and may I cherish the hope that each succeeding year may find us with an increased membership, and entering upon a correspondingly enlarged field of usefulness.

This Association can point back to the records of its labors with gratification on the one hand, while on the other we must confess that similar organizations in some of our sister States have set examples from which we can take profitable lessons. Every county in this State should be represented in this society. County or district societies, auxiliary to this, should be formed throughout the State, which would concentrate as much as possible all the progress and advanced knowledge in horticulture; which would embrace the testing of the many new fruits and vegetables in various soils and localities, utilizing the same to best advantage; successfully aid in counteracting the work of destructive insects and diseases which horticulture has continually to encounter, and methods of shipping and marketing to best advantage. These and other questions of general interest would thus be brought before this Association for consideration, and debates and discussions thereon would be published in our annual reports for dissemination throughout the State.

The depressed condition of agriculture, and the continually increasing demand for horticultural products, should be sufficient to stimulate greater interest and energy in the latter. It is no credit to this great Commonwealth to pay hundreds of thousands of dollars annually for horticultural products, for the production of which it has such ample facilities within its own domain. This Association is considered authority in its field of labor, and should utilize such confidence to the best possible purpose. To this end, no questions of a trifling nature should occupy the time of its sessions, but only such as will tend onward and upward, not only in producing the choicest products of our soils for the sustenance and health of our bodies, but also those which will elevate and refine, which embrace a taste for the beautiful as well as the useful—such as choice flowers, shrubs, ornamental trees, lawns, etc. Where families are surrounded with such adornments, placed there from a feeling of love for them, we may expect in their midst not only happiness, but also intelligence, refinement, honesty and, purity. It is, therefore, not only the privilege, but the duty, of this Association to apply its energy, knowledge, and talent toward the aforenamed ideal.

The field of the practical horticulturist is an attractive one. For the amateur it is simply enchanting. The producing of new varieties by cross-fertilization and hybridization has become one of the most interesting employments. The knowledge, the power, and facilities granted to man to create new fruits, flowers, and vegetables innumerable is a gift for which he should be grateful to the Divine Author. What has been achieved in this field within a quarter of a century is an indication of the probabilities of the future.

From the wild strawberries, little larger than peas, have been produced thousands of new varieties, many of the best of which we see in our markets in their season as large as hulled walnuts. Whether size will continue to be increased, so as to make it necessary to slice them for the table, the future must decide. Where we had only a few popular grapes within our recollection, we now have them by scores, and appear only on the threshold of what we may reasonably hope will be obtained. If the future will not belie the past, this country will, by and by, have as excellent grapes, in variety, as any other, thanks to Mr. Rogers for opening the door for such possibilities. To Dr. Kirtland is due the gratitude of lovers of cherries, for so many fine varieties. Peaches have been multiplied by the continual adding of new and improved varieties whereby their season has been extended, within our recollection, fully one month. The large list of pears is principally of foreign origin, but the number of excellent native varieties is rapidly increasing, so that in the near future our country will have native seedlings from which to select all that may be desired.

Of all fruits, the apple stands at the head for general usefulness, and yet, in my opinion, less has been done proportionately toward producing new and valuable varieties than with any other fruit. True, it flourishes so readily over a large extent of territory that a great variety of seedlings have established themselves without much aid from man. Among them are many very valuable ones indeed. For variety, our State is, I believe, behind none, yet we have very few winter apples that are generally popular throughout the State; consequently, there is much room for progress in this direction. There is scarcely a fruit farm upon which new and improved varieties have not been raised, including blackberries, raspberries, currants, and gooseberries.

The same is also applicable to nearly all flowers and vegetables. The method of cross-fertilization and hybridizing is now so generally understood and so easily learned that it is not strange that so many apply themselves to it. True, it is like a lottery, where the large majority draw blanks; but nature would not be true to herself in permitting stock-breeders to obtain their ideal, and refusing the same knowledge in the vegetable kingdom; for if stock-breeders can, by proper selection, breed beef, or butter, or milk qualities, or size, or color, or dispense with horns, why may not similar ends be obtained in the vegetable kingdom? Why not establish varieties of apples without cores, of which we hear occasionally, or peaches without seeds, as we find now and then very fine specimens with only the rudiments of pitts? May we not hope that the laws which govern such matters will be known in due time? Meanwhile, let all who can raise new seedling fruits and flowers, observe closely, and keep a record of all items of interest that may seem new. Crosses should be made by design, which would form a reliable basis for future operations.

Let us take, for instance, Kieffer's hybrid pear, which seems to have all the qualities that we could reasonably wish in a pear except one, viz., eating quality. Now, if we could, by cross-fertilization combine, with its hardiness, vigor, early and prolific fruiting, size, beauty, and keeping qualities, the deliciousness of Dana's Hovey, we would have an ideal pear

Suppose one thousand men or women throughout the country would make said cross, and, if possible, at the same time cross the former with a half dozen other good varieties, there is no telling what the result would show in a few years. But, whatever may be done, I will here predict that the Kieffer is destined to become the parent of some very valuable varieties.

Of apples, King of Tompkins County is with us a shy bearer and not a very good keeper; but could we combine its beauty, size, and delicious flavor with the superior bearing and keeping qualities of York Imperial, which is of fair quality, we would have a winter apple superior to any that we now have. I do not claim that those desirable blendings of two varieties will or can be obtained, neither is there anything positive that they may not.

These few hints I have thrown out simply to stimulate some to engage in this exquisite but noble work. Especially would I induce women to engage in this delicate operation, since they can manipulate such fine processes better than men. A beautiful and enchanting field is here open for women. Objections may be made against indefinitely multiplying new varieties, but let our courage to cast into oblivion all productions not having special merit be equal to our enterprise in producing them. By following such a course, the present and almost embarrassing list of fruits would be sifted, and a higher average quality established. Horticulturists should aim to produce fruits and vegetables of best quality, instead of simply for size and show, and at the same time educate the consumer to the same standard. Such an object reached would crowd out of our markets inferior productions, which are purchased and consumed simply because nothing better is obtainable. Nothing, however, is more reprehensible than the frauds practiced by unprincipled venders in topping off inferior products with others to attract.

I am not aware that this fraudulent practice is carried to so great an extent as in the barreling of apples, where both ends of a barrel are topped off with nice fruit, and trash in the middle. Laws should be enacted which would reach such scamps by fine or imprisonment, or both.

Nut culture has not received the attention it deserves, especially chestnuts. These are more palatable and nutritious than many much more popular articles of food, and could be grown in quantity, and with more profit pecuniarily, than many other fruits, since we have now several improved varieties of large size, good quality, and profuse bearers, and which can be grafted successfully on common stalks or trees. There are thousands of acres of land in this and other States that are stocked with chestnut trees which are worth but little, that might be cleared and sprouts of one year's growth top-grafted at proper distances, and all else kept down. These would, in six or ten years, yield more reliable and profitable crops than some occupying much more valuable ground.

Mushroom culture deserves more attention than it has thus far received. Large quantities of delicious food could be grown where nothing else will grow, and be made profitable besides. There are a number of varieties of edible fungi which should be grown and utilized, and would be, if the matter were brought before horticultural meetings and intelligently discussed.

Mother earth yields her products in such variety and profusion for the happiness and welfare of man, if he will only do his part in aiding her, and not pervert her delicious products to his own injury and degradation; neither should he degrade himself with such of her products as were never intended by the Creator for him to indulge in, and so long as he will continue to do so, the millenium will be in the far future.

May we indulge the hope that the broad acres now devoted to the culture of the nauseous weed will by and by be occupied with the most delicious, beautiful, and gratifying, body and soul-cheering products? And may the vender of these products supplant him who is now dealing out degradation, crime, and death broadcast in the shape of intoxicants and narcotics. And may we advance a step farther, hoping that he will eventually attain to the higher plane of supporting himself directly from the products of the earth, instead of second hand, from animals.

May we realize the proverb that fruit makes man good-natured, which should culminate in his no longer imbruing his hands in the blood of his fellow-man; yea, more, not even in that of innocent animals. I will venture the assertion that those who follow horticulture from pure love for it stand as high, morally and intellectually, as any other professional; and that criminals among them are as rare as angels' visits. Let us then honor our noble calling by laboring onward and upward, endeavoring to diffuse pure and true horticultural lore broad-cast over the land.

To this end we must apply energy, vigilance, and coöperation. We must permit no retrograde movement. Our library, established a year ago, should be made largely instrumental in the diffusion of horticultural knowledge.

The secretary should be directed to exchange with kindred societies all the surplus copies of Agriculture of Pennsylvania allotted to our Association. The librarian, in order to discharge the duties of his office effectively, should be compensated, and I suggest that he be granted a salary in accordance therewith. He should also be requested to produce an annual printed catalogue of all books in his charge for the benefit of the Association.

With each succeeding year some of our members are removed by death. J. L. Stichter, of Reading, and William L. Schaffer, of Philadelphia, have passed away since our last meeting. The former was an enthusiastic worker in whatever he took hold of. The members of the Association who were at Reading several years ago at our annual meeting will remember the whole-souled hospitality with which he entertained them. William L. Schaffer was a true friend of horticulture, to which he devoted much of his time, not for the sake of dollars and cents, but from pure love for it, and aided others to the same calling with a lavish hand. He died at a ripe age, honored and respected where he was best known.

And now, in conclusion, I cannot express my feelings better than by quoting from an address of Marshall P. Wilder, delivered before the American Pomological Society, whose president he has been for a quarter of a century:

"Standing here as conservators of American pomology, enjoying, as we do, such peculiar privileges for research and discovery, let us use every effort to advance our cause by diligent experiment and observation, so that, as we come up from session to session, we may add something to the common stock of information, and thus develop for the good of mankind the rich treasures which our science has in store for the world. Thus let us work on, hand in hand, to scatter these blessings broadcast through the land. Others may seek for the honors of public life, or the victories of war, which too often carry with them the recollection of wounded hearts and painful disappointments; but let us continue to work on, feeling assured that our labors will cause no regret. As Mrs. Sigourney has beautifully versified my former remark:

'No sting in the bosom of memory we're leaving;
No stain on the pinion of time.'

"Let us commence the new century in the history of our republic with increased enterprise and zeal for the promotion of our cause, and should any of us be called from our labors on earth, let us feel assured that others will continue the work we have begun, and carry it forward to still greater perfection. Let the successes of the past stimulate us to greater perfection for the future. Let us work on, full of hope, regardless of all obstacles,

'Still achieving, still pursuing,'

until we reach that better land where the garden shall have no blight, fruits no decay, and where no serpent lurks beneath the bower—where harvests are not ripened by the succession of seasons—where the joys of fruition shall not be measured by the lapse of time."

Mr. D. E. Longsdorf, of Mechanicsburg, Pa., read the following essay on

The Fruit Industries of the Pacific Coast.

FELLOW MEMBERS OF THE STATE HORTICULTURAL ASSOCIATION:—By request of our Secretary, I have consented to say something on the fruit industry of the Pacific slope of our country, and in this I shall not expect to advance any new theories, or refute any opinions of those who have observed for themselves, but only mention my own observations and conclusions, after spending four months during the past season directly with the fruit men of that region, extending from the southern part of California to Washington Territory. And it is with pleasure I refer to such fruit men as E. J. Wickson, secretary of the State Horticultural Society, and Messrs. Hixon, De Long, Hatch, Cozzens, Bullock, Wetmore, Cooper, Hollister, and others, of the leading fruit men who would willingly reply to inquiries on this subject rather than treat you with silent indifference.

California has many advantages that eminently fit it for fruit culture, and years ago some of the fruits now common were grown by the Jesuit settlers of the country. Among them we find the Mission grape, purple fig, and others. But the industry as it now exists is the growth of a score of years only, and its pioneers are yet living and among its active advocates. The first attraction in California was not its delightful climate, its grain fields, or fruit orchards, but gold, "the root of all evil," which was then to be found in every mountain gorge, and along every stream, and which finally turned the country up-side-down, leveled mountains, filled up rich valleys, and made a barren waste of many productive lands. But by converting the mining flumes into irrigation ditches, and watering a rich virgin soil, that California's great wealth was discovered, and thousands of miners sought a more renumerative field of labor. From the barren lands of southern California to British Columbia, and from the coast to the summit of the Sierra mountains, the fruits of many countries and climes have found a congenial home in some favored spot.

In the coast country, with its almost changeless climate, where moisture is abundant, is the home of small fruits; while on the hills of the coast range are grown the apple, pear, plum, prune, and cherry, which mingle still farther east with the apricot, peach, nectarine, and grape. The warm interior valleys, shut out from the cool winds of the coast, produce the raisin, grape, figs, oranges, lemons, limes, &c., and also place upon the markets of San Francisco the earliest fruits of the season; and in the foot hills, which rise from the valleys gradually to the snowy mountains, all find an agreeable altitude for their development. Near the summit of the Nevada range I have seen the apple flourish and bear the richest flavored fruit. In this wide range of country we have many varieties of soil, most of them wonderfully productive when sufficiently moist, and well adapted to fruit culture. In many places sand forms a large percentage of the soil, and an unattractive barrenness is noticeable that has delayed the settlements of the country until of late years. Such was the condition of Fresno and Tulare, but now these places are among the attractive fruit lands of the State, made so by the free use of water. In contrast with these light soils are the adobe soils, which are naturally hard and dry in summer, but by irrigation are the garden spots of the State, and well adapted to the growth of the citrus fruits, the apricot, grape, English walnut, &c. In the south are the mesa lands, of sand and gravel, the home of chapparel brush and cactus, of small and dwarfish growth, and no more undesirable locality can be found anywhere, when destitute of water. Yet on these lands are Riverside, Coulton, &c., with their flourishing gardens and orchards, as an illustration of what water will accomplish when properly applied. And lastly, we mention the reel clay and gravelly loam of the foot hills, which is now attracting attention as a fruit soil. One year ago the prize grapes at the State fair were grown near Colfax, at an elevation of four thousand feet.

The conditions are most favorable for fruit-growing here—the proximity to the sea, with its warm ocean currents, and its high mountains, produces a soft and even temperature, where spring frosts do not blight the prospects, or autumnal storms scatter the garden fruit upon the ground when you are about to gather a bountiful harvest. The freedom from storms is very striking in the mountain forests, where the trees grow to enormous dimensions, as straight as an arrow, and from two hundred to three hundred feet high; often not more than three feet in diameter, while near by may be a giant of the forest, thirty feet in diameter and three hundred feet high, a living witness of vegetable growth for twenty centuries. If one of these monsters stood beside the Washington monument in Baltimore, that massive column would be hidden from view, and the statue rest beneath its shade. The rains of winter and spring, in many places, are sufficient to grow large and fine fruit, while the dry summer adds flavor and color; and where rains fail, the system of irrigation is very complete, and its effect wonderful. Irrigation for fruit culture is, at this time, an open question, with able advocates on either side, and whenever quality is of more importance than size, irrigation will be less frequent. It is a noted fact that fruits grown by irrigation lack flavor, and often color, and in the San Francisco market sell for less than those from the foot hills, or from Oregon, where there is sufficient moisture. In many sections of California barren lands are made productive by irrigation alone, and the citrus fruits of Riverside, Orange, and Santa-Anna are deservedly noted.

The vegetables are also of wonderful size. I remember seeing a sweet potato of thirty-four and one half pounds' weight, and was told of squashes of one hundred and eighty pounds, of beets, two hundred and ten pounds, and cornstalks twenty to twenty-five feet high. Some such monsters can be seen at the New Orleans Exposition. These are not common. We have seen the statement that the water supply of California is limited, and gradually diminishing, and that at some time in the future these valleys and hills will be a barren waste. The fear of such a calamity will not deter many persons from planting, with the recollection of the disastrous floods in many places, and abundant rains everywhere. During the past season, when the fall of water was three times as great as the average, and with the Pacific ocean on one side, from which the moisture is carried far inland by the trade-winds during the day to settle as dew at night; and the Nevada mountains on the other, the great reservoir of the State, where the snows of winter rest beneath the dense foliage of its forest of evergreens in midsummer, and the open porous soil holds in reserve the melted snows, which filter gently into the streams, that rush down every mountain gorge, to water the growing crops. With such a condition of things, the limited water supply is more fanciful than real. Fruit-growing is fast becoming the leading industry of the coast, and the value of land is estimated by its adaptability to this purpose.

The best fruit lands are sometimes worth three hundred dollars per acre, without improvements, and with growing or bearing trees are worth much more. The best wheat lands are worth one hundred dollars per acre. The crop that yields the most annually is most valuable. Fruit far surpasses any other crop, and often returns five hundred dollars to seven hundred dollars per acre, annually, but that is not all profit, about fifty per cent. being the cost of production. In the year 1883, apricots were an abundant and profitable crop, while in 1884 they were a failure. The people of California are aroused on this subject, in a way we never dream of here, and when you visit such fruit centers as San Jose, you conclude that the country is about taken up with orchards, which stretched out for miles in every direction. But statistics show us that only a beginning has been made. During the year 1884, only one eighth of the trees planted were bearing, and fifty per cent. was added to the orchards last season. The varieties are those best suited to the locality, and mostly apricot and prune. Many large orchards were planted last season, some of several hundred acres. Apples are also receiving more attention than formerly, especially on elevated lands, as the foot hills, where thousands of acres of mansaneta and chapparel brush lands are dug up annually and set in fruit trees and grapes. In the south the only limit to orange-planting is the want of stock to plant. Good orange land is very valuable, and those who wish the benefit of another's industry in an orange orchard must pay well for it. The largest trees are just coming into good bearing. Oranges are now worth two dollars per box, and the yield from each tree will be two to four boxes. The quality of the California orange is not equal to those of Florida or Mexico, as they are mostly seedlings, but of late years grafted sorts are being planted.

While much attention is given to fruit in California, Oregon is much in the back-ground. The certainty of a crop, and want of good market, have caused neglect. In California fruit trees make a straight, smooth, and healthy growth; while in Oregon water shoots often hide the trunk, and the crooked, gnarled branches are covered with moss; yet the loads of fruit often break the branches, and make the trees more unsightly. Still, here only one failure has occurred in twenty-one years. When in Oregon I visited the first orchard planted in the State, which was planted by Mr. Luelling in 1847, on the banks of the Willamette river. The trees were carried from the States, planted in a box, and kept alive for six months while on the way and are still living and bearing fruit. In California the same systematic style of cultivation is visible everywhere, the result of study and application. The first thing done, after planting is decided upon, is to cultivate the ground thoroughly, and the planting can be done at any time from December to April. During the first few years, some light crop may be grown in the orchard, but from the third year the ground is given up to the trees, and cultivation is constant. No grass or weeds absorb the strength of the soil, and only in a few places are small fruits grown between the rows of trees. Around Haywards, and San Leandro, and a few other places, currants and gooseberries are grown in this way with partial success. All trees are planted close together—apple, pear, cherry and peach, about sixteen feet each way, and apricot, prune, and plum often closer in the row. All are trained with low heads, and well shortened in branches to avoid too much shade and over-bearing, and to assist thorough cultivation. I visited the fruit ranch of J. F. Wetmore, near Santa Rosa, who has in three years set out sixty acres of trees and vines. He has employed on his farm a force of twenty men, superintended by a horticulturist, and the work is kept moving at the proper time. His planting is largely pear, (Bartlett,) plums and prunes, and the Zinfindel grape for wine. His trees are just coming into bearing, and to be ready to secure the fruit from loss he has erected a fruit house at a cost of twenty-five thousand dollars, finished and furnished in the most approved manner.

Whether this outlay is a judicious one at this time, I will not say, but only mention it to illustrate the spirit of the country. In this place (Sonoma county) irrigation is not neccessary, as it is within the influence of the sea breezes. In some places strawberries are grown extensively, and no doubt with profit, as they continue in market six months in the year. They are large in size, but lack flavor; the result of too little strawberry in so much water is that the shipping qualities are poor and decay is rapid. The same may be said of the cherries, which are very fine in appearance, but not equal to those of Oregon for shipping. Cherries are all sent to market on the stems in small boxes. No unsightly cracks, the result of wet to mar the beauty, or larva of the curculio or other insect to dispute your right of possession; and if there are any inferior ones, they are not on top of the box. Small fruits do much better in Oregon than in California, the climate being more favorable for development, though there are places in California near the coast where they are grown with profit.

One of the staple fruits of the Pacific slope is the grape, which is grown more largely than any other class of fruits, and all sections and soils appear to favor its growth. The cool altitudes of the foot-hills, or the low and sultry valleys; the regions of the extreme north, or the irrigated lands of the south, all are alike its home. The wines of Marysville, or of the Napa valley, equal those of Los Angeles or Anaheim; and raisins from these distant points are on the market side by side. The grape is cultivated the same as fruit-trees, and the ground is kept free of weeds, no stakes or trellises are used for support, but the training is to a straight stem from two to four feet high, which stem becomes stout and strong with age, and capable of supporting several hundred weight of fruit that may cluster about its branching head. In trimming, the branches are left about one foot long. The varieties mostly grown are the Muscats, Malaga, and Mission. Single bunches of these often weigh five or six pounds, and sometimes eight pounds per bunch is reached. When at Santa Barbara I visited the place where grew the mammoth vine which was exhibited at the Centennial exhibition in '76, and where its mate is yet standing, a large and stately vine, whose solid stem is fourteen inches in diameter. This vine covers one fourth of an acre of trellis, and three tons of fruit have been gathered from it in one season.

Many special fruits are grown in places favorable for them. The olive is a success at Santa Barbara and San Diego, and an excellent quality of oil is made there. Last year the first dates were grown in California by Mr. Cooper. Japan persimmons and loquarts are also grown, and last year the Saga palma was first planted. I inquired of a florist in Los Angeles the price of one tree two feet high, and was told seventy-five dollars, as it was a small one. The guava, pomegranate, and banana are also to be seen.

Fruit-growing on the Pacific slope is not mere pastime, and success so certain that an abundant harvest is assured from the beginning; but there are here many disappointments, and perplexities meet the fruit-growers at every step. If the climate is favorable for the development of fruit, it is equally so to insect life. There is no cold winter to cut short the crop while in the pupa state, or failure of food-supply to starve them out; but all is favorable to a varied and abundant crop, and he who hopes to get away from his insect pests of the East, by starting a fruit-ranch here, will find a numerous company of them to welcome his coming.

Also, he will make the acquaintance of some new ones. One of the new insects is a peach-borer, which deposits its egg in the terminal bud of the new growth, and the larva makes its way into the bough which decays for several inches, and thus it threatens to destroy slow-growing kinds of peaches. There is no remedy yet for it. Insect enemies attack the root, the collar, the trunk, the branch, the leaf, the bloom, and the fruit. The codling moth is very destructive. In the orchard of Mr. DeLong were gathered four thousand five hundred boxes of apples of fifty pounds' weight each, and of these but eight hundred boxes were good, sound apples. The insect that renders the orange trees and fruit very unsightly, in many places, is the scale bug. It fastens to the branches, and, like a leech, feeds upon the life of the tree. From its attacks, a fine, sticky spray settles on leaves and fruit, and soon conceals the original color with a sooty black. Los Angeles oranges are distinguished by the blackened rind. At Riverside the scale bug is not known, and there the trees and fruit are free from this black smut. The curculio has not yet appeared west of the Rocky mountains, but they are waiting for his coming, and watching for his crescent mark upon the fruit.

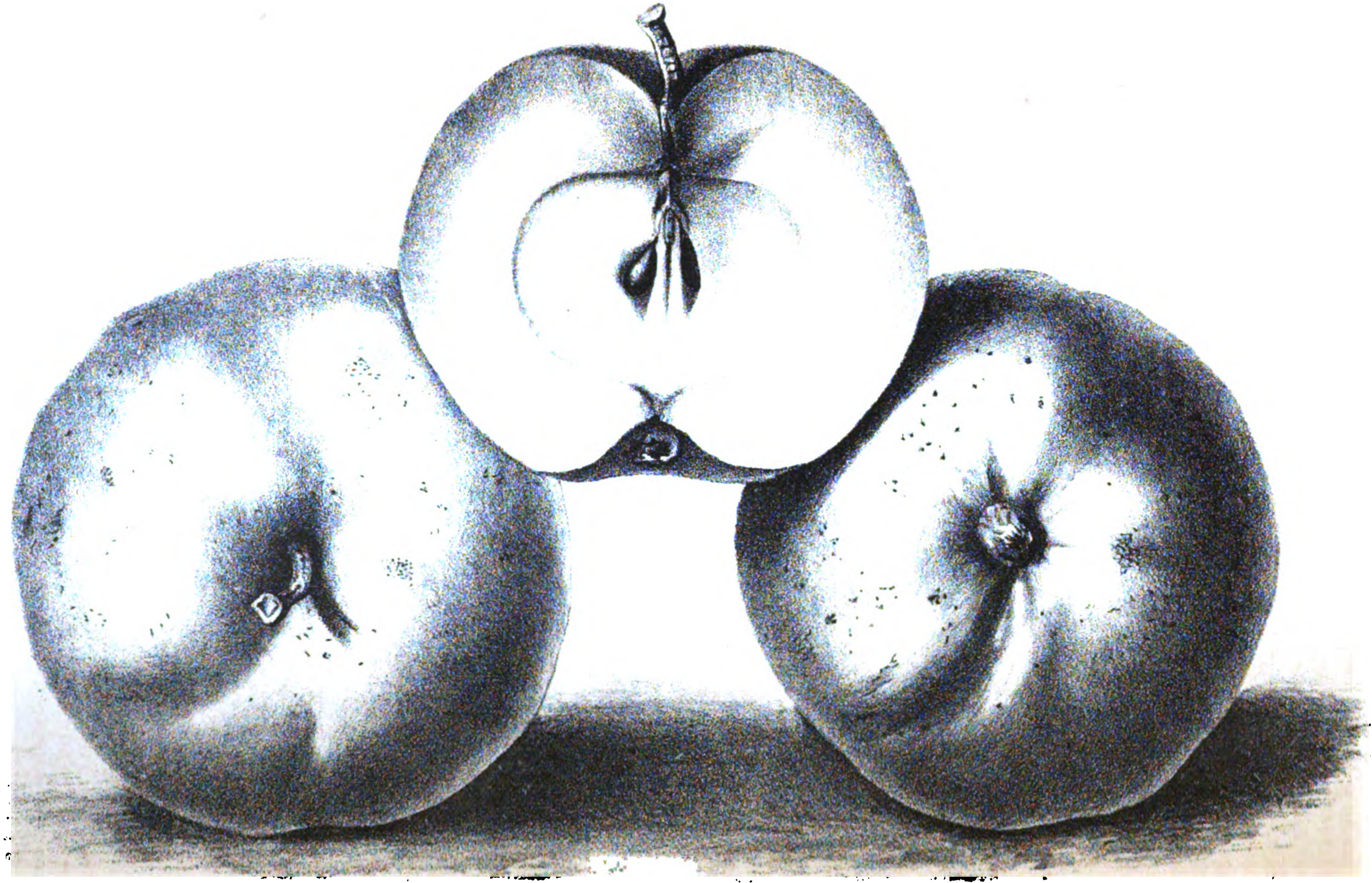
On account of the attention required, and labor in the fruit industry, and the rapid increase in acreage, the labor question is forcing itself upon the attention of many. And if there is difficulty already in procuring help to care for the fruit, with only one eighth of the trees in bearing that are planted, what will it be when all are in bearing, with eight times as much to care for! Most of the farm work is performed by Chinese, because they are cheap laborers, and willing to do anything. For this reason others do not care to labor with them. In my judgment it was short-sighted policy to restrict their introduction in the sweeping way it has been done, so long as land-owners will engage cheap labor, and when the Chinese are driven from the field, some other foreigners, equally degraded, will step in.

Horticultural societies are common in California. First, the State Board of Horticulture, then the State Horticultural Society, which is doing a good work in every part of the State. This society numbers among its members many of the leading fruit men of the State. At their meeting in October last, they resolved to ask the State to aid them in their work, by granting an appropriation of twenty thousand dollars, and a professorship in the State College. Local societies are also in active working order, each member being desirous of adding to his store of knowledge by obtaining the experience of others.

Another very important question for California fruit-growers is how and where to find a market for their fruit. In view of the large number of trees not yet in bearing, and the crowded condition of the market, the limited home consumption, and competition from Mexico, they must seek other outlets for their fruit, and so preserve and prepare it as to place it upon our markets, at competing prices, and, if possible, drive us from the field. This may appear idle to many, but knowing something of the methods of fruit-growers here, and also there, and their plans for the future, I do not hesitate to say that in a few years our markets will be filled with California fruits, and our home-grown forced out. One grower asks us (by letter) to find a market for the products of his orchard next year, which he estimates at seventy-five tons of apricots and one hundred tons of French prunes. His orchard contains eighty acres. Soon a fast freight will be placed on all through roads to California, which will deliver fruit in the eastern cities in about eight days from the grower, and at much reduced rates. The fabulous prices for fruit in California are about over, and, instead of realizing from three to five hundred dollars per acre for orchard products, estimates of profit are now made on fifty dollars per acre, which was shown at the meeting in October to be four times more profitable than wheat-growing, which is ten dollars per acre. The usual distance at which trees are planted apart is one rod, or one hundred and sixty trees to the acre. The average price of apricots, prunes, and most fruit when sold is two-and-a-half cents per pound to shippers, canners, or evaporators, and at the low estimate of fifty pounds per tree, we have about two hundred dollars per acre, and this quantity is often double. Now, when the price in California is reduced to one fourth present rates, and yet yielding a large profit to the grower, and freights from two-and-a-half to one-and-a-half cents per pound by the car-load, and time in transit shortened from twenty days to eight days, then we shall have such a rivalry in our markets as will compel us to seek some other channel of profit, or make renewed efforts in horticulture. This time may seem a long way off, but attention to the discussions of fruit men in California during the past season convinces me that it will come before we are ready for it. And with a new impetus given to the introduction of early and tropical fruits from Cuba and the Pacific slope unloading their immense over-production upon our markets, in connection with the uncertainty of a fruit crop here, shall we quietly await the issue, or, by renewed efforts, place upon the markets, beside these foreign fruits, those fresh from our own orchards, so fair and fine in quality that we will have the preference.?

Mr. MEEHAN. I have listened with much interest to the paper just read, and, having myself traveled over nearly the same route some months ago, I can, on the whole, indorse his views. I cannot, however, agree with one idea advanced, and that is, that with cheaper transportation and increasing crops in California, our home-grown fruits will eventually be crowded out of the markets. I have so much fears, and in my opinion California has already seen its best days for some varieties of fruits. Some of the disadvantages they are contending with there will continue to increase in magnitude, and make the business unprofitable. Blight, fungus, and leaf curl are serious drawbacks in many sections, and insects are rapidly increasing. My attention was called to large orchards of pear trees, ten to twelve years old, in which all were dead, from some cause which is far more destructive than our "fire blight" in the East.

The codling moth is increasing rapidly, and becoming more destructive



"KEIM"

Origin, Berks Co., Pa. Tree, moderately vigorous; fruit, small to medium, oblate; skin, light waxen yellow, thickly sprinkled with light russet dots; stalk, long and slender, in a broad, shallow cavity. Calyx closed. Flesh, white, tender and crisp, with a fine, brisk, sub-acid flavor. Very good. Bears heavy crops alternate years, December to March.

every year. Attempts have been made to destroy them, and in one section a large sum was actually subscribed to induce fruit-growers to destroy their entire crops of apples for one year. Some employed men to destroy them every day, and in one orchard fourteen thousand were caught in a season. Hay bands and lamps or torches were also resorted to, but with all these methods, insects are rapidly multiplying. Having such disadvantages to contend with, we can see that our fruit industries in the East are not in any immediate danger from competition, and I came back from the Pacific coast fully satisfied that, all things considered, we have in Pennsylvania one of the best fruit States in the Union, and that our chances for success are superior to theirs.

Mr. D. E. LONGSDORF. I think we lack the energy and enterprise of our California fruit-growers. They are now arranging to ship their fresh fruits east by fast freight. One gentlemen at San Jose stated that he could place in our market five hundred tons of French prunes, and was only awaiting satisfactory arrangements as to freights.

Mr. H. A. LONGSDORF. There is no danger of apricots or prunes coming in competition, as we cannot raise them here.

Mr. MEEHAN. In regard to apricots, they are grown successfully there, no doubt, because of the absence of curculio; but this insect is rapidly traveling in that direction, and will soon be there. In Nevada, where the wild plum grows spontaneously, this insect is as plenty as here in the East, and it will be but a short time until they reach the Pacific coast, after which apricots will be as difficult to grow there as here.

Mr. SATTERTHWAIT. Why do codling moth and other insects increase more rapidly in California than here? Are there no birds to destroy them?

Mr. MEEHAN. The climate is more favorable, and codling moth makes continuous broods the entire year. Then it flies at night and could not be destroyed by birds. They may not have "yellows," but they have "leaf-curl," which is just as bad.

Mr. D. E. LONGSDORF. I did not notice any yellows, but never saw leaf curl so bad. Notwithstanding all these drawbacks, one gentleman realized, in 1883, nineteen thousand dollars from an orchard of sixty-five acres, almost exclusively peaches.

Mr. FOX. If no essays are to be read, and there is nothing else before the meeting, I will read a letter giving a brief history of the Keim apple. This letter is from Mr. Rutter, of West Chester, and was written to President Stitzel, who could not be present at our opening sessions, and will, perhaps, not be able to get here at all.

HON. GEO. D. STITZEL,
President State Horticultural Association of Pennsylvania:

DEAR SIR: In looking among some old law papers this evening for a piece of red tape to tie up a report I had just prepared for our committee on "Insectivorous Birds," to be presented at our approaching Lancaster meeting, I accidentally came across a carefully tied-up package of old letters from friends of days long past, and from it, with others, I drew two letters, of much interest to me, from my old friend, George DeB. Keim, of Reading, Pa., dated respectively 1848 and 1851. Mr. Keim was then in his seventieth year, as he incidentally informed me in his letter of the former date, and quite infirm. I had forwarded to him shortly before, perhaps the preceding year, some very fine peaches, and in the fall he returned me a basket of your noted Berks county Keim apples, with which I was so favorably impressed for its beauty and quality that I wrote for a few grafts, which came in the spring, accompanied with a letter from him inclosing a paper containing a full history of the apple.

Mr. Keim states in his letter: "We got the grafts this evening, packed them as well as we understood, and sent them by stage, inclosing a paper how we got the apples and from whom." This is a copy of the papers here referred to, in the hand-writing of Mr. Keim: "An old gentleman by the name of Kreutz purchased a tract of land in Albany township, Penn's Manor; the Indians had formerly a town or settlement on the same. When he commenced clearing the land near a spring, he discovered an apple tree; he trimmed it, and of which came the apples you speak of. He, Kreutz, was collector of taxes, and my father, commissioner. When he came to settle his duplicate he brought some apples to father, who was pleased with them, and sent me for grafts, and distributed them in our neighborhood, from which circumstance they got the name of Keim apples."

In a former letter, Mr. Keim speaks of these apples and grafts being obtained in about 1790. At that time Mr. K. was a boy of some twelve years of age. As the old gentleman was a highly honorable and prominent citizen of Reading, beyond a mere description of so good an apple, this history may possess other interest to the citizens of Reading as a speaking relic of private history, linking the name of so good a man with the progressive cause of pomology. It may be considered well worthy of a record in your proceedings at Lancaster, and if so, present the matter in such form as you may think advisable.

Very truly yours,

JNO. RUTTER.

Adjourned.

THURSDAY MORNING.

Vice President HOOPES in the chair.

Mr. HARRISON. I should have announced last evening that the Pennsylvania Horticultural Society of Philadelphia has appointed me a delegate to your annual meeting. We expect to hold four public exhibitions at Horticultural Hall during the coming season, to which all are cordially invited. Our programme of prizes will be ready for distribution in a few weeks, and I will be pleased to send copies to any who may apply. I have also some calendars of our society, showing the dates of our several exhibitions, and will place them upon the table for distribution.

Mr. HOOPES. It was suggested last evening that a portion of the morning session be devoted to the discussion of questions relating to floriculture and the ornamentation of homes. Anything relating to these topics will be in order.

Mr. ENGLE. Some of our members, who are specially interested in these topics, are not yet here, and I hope other business will be considered until they arrive. If in order, I offer the following:

Resolved, That a committee of three be appointed to act in conjunction with the Executive Committee, and to examine the constitution and by-laws of this Society, and report at next annual meeting what, if any, changes are necessary; said committee to be appointed by the next President.

Mr. HARRISON. It will be well to appoint a committee of this kind, because a constitution and by-laws are apt to become superannuated and to require changes. Some committees may be called for and appointed that are utterly useless; others may have no clearly-defined duties, and never report. New committees may be necessary, and I trust the resolution will pass and the subject have careful consideration.

Mr. ENGLE. I have no fault to find with the by-laws or any of the committees, but it may require changes and suggest improvements, and it will not be amiss to refer the matter to a committee.

The resolution was adopted as read.

Mr. ENGLE. I beg leave, also, to offer the following:

Resolved, That a committee of three be appointed to represent this Association at the next biennial meeting of the American Pomological Society, to be held at Grand Rapids, Michigan, in September next.

Adopted.

Mr. ENGLE also offered the following, which was adopted:

Resolved, That a committee of five on exhibition be appointed, of whom the President of this society act as chairman, who shall consider and decide what exhibits shall be made, and arrange for proper display of the same.

On motion of Mr. MOON, the third topic on the list, "Potatoes—Best and Earliest Varieties, and how to Grow Them" was taken up for discussion.

Mr. HARRISON. I did not expect to be called upon, but as you have asked for my views, I will give a few items of my personal experience. In 1863, I took charge of a small place of nineteen acres, twelve of which were arable. Classically speaking, I was then a "horticus" not a "rusticus." It was a starved-out, worn-out place, and I hired with a view to improve it as a dwelling and a home. Being a beginner, I apprenticed myself to myself, planted the ground in sundry crops, from which I realized the first year eighteen hundred dollars. The next year I was a journeyman in the business, and my sales amounted to twenty-seven hundred dollars. The following year I was "boss," and sold from the same ground sixty-one hundred dollars worth of potatoes of twenty-one varieties. They were manured with a special potato fertilizer, and grown on a different method from that usually pursued. I would say just here that I have no faith in chemical analysis of soils as usually recommended for farmers. They have no practical value, because, even if the necessary elements are present in the soil, they may be in such an elementary condition that they cannot be utilized by the growing crop. I would feed plants on the principle that "like produces like." If I were buying a fertilizer for pear trees, I would pay the highest price for ashes of that particular wood. Any ashes would be good, but pear ashes would be best for pear trees.

The little farm which I had taken charge of had been manured for fifteen to twenty years, but as I desired a special fertilizer for potatoes, I obtained several analyses of the entire potato plant, and then prepared a special compost for such crop. I bought six hundred bushels wood ashes, added twenty bushels finely-ground bone, and a liberal supply of oyster-shell lime. Having prepared the best form of fertilizer for the purpose, I selected medium sized, perfect potatoes, plowed deeply, planted them *whole*, three feet apart each way, putting a handful of fertilizer at each hill, and kept the entire twelve acres as clean as a garden. The vines made a remarkable growth, sometimes lapping over each other as much as eighteen inches. Three hills failed, probably owing to moles and field mice, but, notwithstanding this I had, two thousand eight hundred and eleven bushels of marketable potatoes. Had I planted all of varieties that I knew yielded best, I would have had over three thousand six hundred bushels. Flat culture is best. The hilling system is borrowed from England and is not adapted to this country. Continual cultivation is essential. One hill in the aforenamed crop had thirty-one full-sized potatoes. Rot was bad that season, and the crop was stored in the house and barn cellars. I sprinkled all with air-slaked lime, and in spring had about two baskets of unsound potatoes. Mr. Nicols, of the *Boston Journal of Chemistry*, who is a practical agriculturist, and makes a thorough test of fertilizers before recommending them to his readers, says, that of all potash fertilizers he ever used, there is none so near perfect as hard wood ashes. Nitrogen and other artificial fertilizers are over-estimated. Have never tried " kainit, " but think it is also rated far above its real value.

Mr. HILLER. After the able address we have just heard, but little remains to be said. However, some of us country folks try to raise potatoes, and it may be interesting to know our method. I have, therefore, prepared a brief paper, which I will read :

In successful potato-culture it is of importance to select land so level as to escape the washing of the soil by the heavy thunder-showers of the summer. The crop is frequently ruined on hill-sides by heavy rains. A clover sod is best for a potato plot; but, as it usually interferes with our corn ground, we take corn-stubble land. Deep plowing is of more importance in potato-farming than in any other crop; about eight inches is a good depth. I have been in the habit of making wide drills, five or six inches deep and three feet apart. In these drills I scattered the fertilizer, and then dropped the seed one foot apart, and then covered with the plow. By many careful experiments made by the *Rural New Yorker*, it appears to be preferable to drop the seed and cover lightly, then sow the fertilizer carefully in these drills, and then harrow to fill, or nearly fill, the furrows. Should rain occur before the sprouts appear, the harrow should be used again to prevent the ground from baking ; if not, the harrowing may be deferred until the sprouts make their appearance, when the ground should be thoroughly harrowed. This will destroy weeds and aid the potatoes to make a good start.

The after-cultivation will be with the hoe and shovel-harrow for two purposes—to destroy weeds and keep the soil mellow. If there were no weeds, and the ground would not bake after rain, it would be safe to let them alone ; but, in my ground, it is necessary to hoe out weeds between the plants at least once, and to run the shovel-harrow between rows as soon after a rain as the ground becomes dry enough to work, and this can often be profitably repeated through the greater part of the growing season. Every successive cultivation should, however, be shallower. This level culture I have practiced for several years.

In my opinion, a medium potato, cut in two, is the best. If all the conditions are right, a single eye, with a small bit of potato to it, will answer very well; but, if the ground should be wet and cold, this small bit may rot, or if the ground be very dry, the plant starts weak and may not recover. We cannot afford to run the risk of having a poor set for the sake of saving a few bushels of seed to the acre.

Among the scores of varieties tried, the White Elephant stands unrivaled in quality and productiveness combined. I might say that, in my experience, commercial fertilizers are better than barn-yard manure for potatoes. Any of the complete fertilizers, viz: those that contain potash, phosphoric acid, and nitrogen, answer a good purpose. I have been using a mixture of four hundred pounds of sulphate of potash, four hundred pounds of acid South Carolina rock, and two hundred pounds of nitrate of soda. Of this mixture I apply from six hundred to eight hundred pounds per acre I have raised, by this process, from three hundred to four hundred bushels per acre.

Mr. R. A. **WICKERSHAM.** I have a good measure of success with potatoes, but instead of planting in checkered rows I prefer planting in rows three to three and one half feet apart, and hills one foot apart on the row. There are many modifying circumstances to be considered, but clean and thorough cultivation is indispensable to success.

Mr. **ENGLE.** I have tried Early Rose and Extra Early Vermont, and have been able to detect little, if any, difference. I prefer Early Ohio to either, as it has proven earlier than the others; does not make such large foliage, potatoes good, average size, and few small ones. In quality it is fully equal to Early Rose.

Mr. **FOX.** The printed question called not only for the best early potato. We would like the opinion of the Society as to the best variety for general use.

Mr. **MCGOWAN.** In my experience, Peerless is the best for general cultivation. It is a good keeper, very productive, and of excellent quality.

Mr. **JAMISON.** I have tried several varieties, but would place Peerless at the head for general crop.

Mr. **HARRISON.** The Harrison potato, of which Mr. Fox made inquiry, was raised by Mr. Goodrich, of Utica, N. Y., and named for a friend of his. Mr. Goodrich experimented with Chili varieties, and raised about eleven thousand seedlings, of which only six or eight were deemed worthy of dissemination by him.

Mr. H. A. **LONGSDORF.** In our locality, the most profitable and one of the best varieties is White Peach Blow. The yield is equal to Peerless, and it is better in quality. Beauty of Hebron is one of the best early varieties. Early Rose has lost much of its character with us, and is not much planted. I would not like White Elephant on account of its name.

Mr. **WITMER.** Last season, Mr. Henderson sent out a new variety under the name of Van Guard. Has any one present given it a trial?

Dr. **RYDER.** It resembles Early Rose. It is quite as early, and promises well.

Mr. R. A. **WICKERSHAM.** Has any one tested Garfield? It compares favorably with Peerless.

Mr. **BALDERSTON.** With me it yields more than any other variety; skin smooth, flesh white, and good quality. Early Rose no longer does well with us.

On motion of Mr. **ENGLE**, Dr. J. P. Wickersham was elected to honorary membership.

Mr. W. H. **MOON** of Morrisville, Pa., then read the following essay:

HORTICULTURAL ADORNMENT OF RURAL HOMES.

There is supposed to be in every well-inclined, intelligent, law-abiding citizen, an interest taken in that one spot on earth which he calls home. That spot around which centers so much that either tends to promote the happiness or misery of the family circle. The subject on which I propose to treat has much to do with making the external appearance of that home pleasant and cheerful, and emblematic of the life which should therein be spent. It seems but proper that a society having for its name such a euphonious title as the State Horticultural Association of Pennsylvania, should, at least, give some attention to that much-neglected subject, "Horticultural Adornment of Rural Homes."

Now, it is not my purpose to do more than allude to this subject, as it relates to the laying out and adornment of the grounds of the wealthy. Those who have accumulated fortunes, and desire to beautify a country home elegantly and scientifically, can well afford to engage the services of a competent landscape gardener, and can indulge in such expensive novelties as their tastes may dictate. This class being able, from their abundant means, to secure all the requisites to make horticultural adornment a success, are not necessarily the objects of our concern. The desire to be like one's neighbors or friends may cause them to indulge in this way, though possibly they may have no taste or fancy for the landscape art in itself.

There is, then, another class of homes, found principally near our large cities. They are mostly of small or moderate size, and belong to that highly-respected class of the community who are yet engaged in active business in the cities, and who have become possessed of a small tract of land in the country. It may be from a love of rural surroundings and an attachment for country life formed in boyhood, or from a desire to obtain more relaxation for themselves, and surround their families with that abundance of fresh air, pure water, and the facilities for youthful enjoyment not to be obtained in a city home. This class, whatever may have been the motives which have prompted them, are a very numerous one and rapidly increasing. They are most inclined to immediately commence to adorn their country homes, but are frequently ignorant of how to do this, though theoretically they may be well informed in book-knowledge and catalogue-literature. They come to the country with an ardor and desire to partake of its comforts, luxuries, and enjoyments. They purchase their cow and chickens, and expect from them to derive at once all the benefits of an abundance of milk, butter, and eggs. They then look to the nurseryman to supply them with trees that will bear fruit the first season without fail, and continuously during their natural lives. They have one acre or more of land, and usually expect from this all the products of a place ten times the size, and frequently, as a consequence, their trees, plants, and vines are set out so close together that the results from none of them are satisfactory.

'Twere well for all, when planting out an orchard or garden, to consult the tables laid down by long experience as the proper distances for planting. I admit to many the distance may seem unnecessary at the time, but rest assured that if the trees grow and thrive as they should under good cultivation, they will eventually produce better results than if twice the number were planted. Our city farmer, having planted his fruit trees, desires the further adornment of his rural home, especially so if his dwelling has been built on a new site and lacks protection from the summer's sun or winter's blast. This question of protection is alike troublesome, whether it be in the landscape art or in politics; but protection our rural will have, and he secures, most likely, the largest trees that can be transplanted, and places them unnaturally close to his residence, and thinks it strange he cannot stretch his hammock beneath their luxuriant shade the first summer. This planting of trees so near a dwelling as to prevent the free circulation of air around it is an error. It should be borne in mind that it is the shadow, not the branches, that should strike the house.

Again, it is not necessary that a tree should be excessively large when moved to make quick and abundant shade. A fine, thrifty, healthy tree, of moderate growth, in nine cases out of ten, will in five years make more shade and become a finer tree than the excessively large one. An ornamentation of these homes with flowering shrubs and evergreen trees, nicely interspersed, and fencing the lawn with an evergreen hedge of American arbor vitæ or hemlock spruce, will do much to beautify and adorn them both in summer and winter. For what can be more ornamental in summer than the contrast between a beautifully kept green-sward and a clump of handsome flowering shrubs, or in winter, the dark foliage of evergreen in contrast with the snowy canopy?

The two classes thus far alluded to doubtless nearly all will acquiesce with me in regard to the importance, advantage, and profitableness of the horticultural embellishment of our rural homes. But there is yet one other class that I fear are not so uniformly fully convinced of all its importance, and who regarded it rather as an extravagance. I allude to our farming community, than whom, as a class, there is none more honest or highly respectable. Many of these do not yet realize the effects of making home attractive in this way, and the influence it may exert on the younger members of the family. They may have provided an abundance of grapevines, small fruits.and an inexhaustible supply of orchards,and have thought in doing this they had done all that was necessary to make home attractive and comfortable. But not so, according to the injunction of Scipture —" These ought ye to have done and not have left the other undone."

The expenditure of a small amount of money in the purchase of ornamental trees, shrubs, roses, and climbing plants, and their proper arrangement, so as to produce the needful shade, and, at the same time, to hide any unsightly objects from view, will well repay for this investment. Donald G. Mitchell, in his work entitled " Out-of-Town Places," says the true art of landscape gardening lies in such disposition of roadways, plantations, walks, and buildings, as shall most effectively develop all the natural beauties of the land under treatment, without conflicting with the uses to which lands may be devoted. And further he says : " It comes within the domain of the landscape art to secure an agreeable lookout from the cherished windows of the country homestead, whatever may be its situation. Accident or choice of site may, indeed, secure this beyond question, but site being established where views are limited, or obnoxious objects fret the eye, it is surprising what may be done by judicious planting." Many farmers look upon ground devoted to a lawn or yard as little better than wasted, and feel that they can ill afford to set aside half an acre or more around their dwelling in which they may, in all probability, spend the remainder of their lives. They count the loss thus sustained by the number of bushels of corn, oats, or potatoes, that said land would yield annually. But, too often, I fear, these same farmers neglect to count the land wasted in impoverished rockeries, covered with dewberry and poison vines, unsightly fence-corners or hedges of sumac and elder that, in all probability, infest their farms. Have your yard and dispense with these unsightly objects, and your farm will be quite as profitable and far more attractive. There is something pleasant about a rural home that has been laid out and planted with some degree of taste and propriety. Though the buildings may be nothing more than ordinary, yet if there has been a nice interspersing of evergreens and deciduous trees in a manner that will break the winter's blasts from coming with undiminished violence against the dwellings, and a future adornment by shrubbery and hedges, there is something about such a home that will exert an influence on the younger generation, and may be the means of causing them to form a preference for a country life instead of seeking their fortunes in the large cities. Surely, the remunerative prices these farms with attractive farm-buildings and pleasant surroundings bring, when placed on the market, should be an incentive to try to make our own so. When we couple with this the satisfaction there is in having one's lot cast in pleasant places, and one's family gathered around, as it were, beneath one's own vine and fig-tree, there is that indescribable satisfaction and happiness which cannot be measured by mere dollars and cents, but will go far toward compensating for the outlay necessary for the "Horticultural Adornment of Our Rural Homes."

Mr. DAVIS. I notice Mr. Moon uses the term hemlock spruce. I am told we have hemlock here, but not spruce, and that they are distinct. Are there two kinds?

Mr. MOON. Hemlock spruce, or *abies canadensis*, is the proper name for hemlock. This is the wood used for building purposes, and known on the market as hemlock. The lumber sold as spruce, as I understand it, is cut from the balsam fir, or balm of Gilead, which botanically is named *picea balsamea*. The name spruce is also applied to the timber cut from the black spruce, which grows in abundance in the forests of Maine.

Mr. ENGLE. Is there not a white spruce?

Mr. MOON. Yes, it is the *abies alba*, and I believe is also used for building material under the name of spruce.

Mr. JAMISON. Can spruce be propagated? I have a new variety with double foliage. Quite a novelty, and as it produces no seed, I would like to see it propagated.

Mr. BRINTON. It can be propagated by layering or grafting.

Mr. HOOPES. Hemlock is one of the spruces, of which we have a number of species. We have white and black spruce. Balsam fir is a distinct tree. Some botanists make it a distinct genus, but it is generally classified as *abies*. I believe the modern classification is spruce or picea. White and black spruce are closely allied to the varieties used for timber.

Mr. REIST. Is not hemlock spruce very difficult to grow and transplant?

Mr. HOOPES. Nurserymen do not grow them from seed. Young plants are gathered from the woods, set in beds where they can be protected and shaded for several years, after which they are easily grown.

Mr. EBY. What is the distinction between fir and spruces?

Mr. HOOPES. Firs have erect cones. Spruces have drooping cones, with leaves on the branches.

Mr. MEEHAN. I am much pleased with the essay just read, and I hope this branch of our horticultural discussions will receive more attention at our hands henceforth than it has in the past. Nothing exerts a more elevating and refining influence, and no investment of time and money brings more pleasure and satisfaction. Some years ago, when traveling in the West, I made an address at a young ladies' seminary. I tried to impress upon them the importance of ornamenting and adorning home grounds. I also called attention to fruit gardens, and the great satisfaction that is to be derived from a liberal supply of fresh fruits in succession throughout the season. Even if not always profitable from a financial stand point, the pleasure and satisfaction afforded by such pursuits will amply repay all the necessary trouble and attention required. One gentleman present thought my position absurd, and ridiculed the idea of doing anything for mere pleasure, unless there was a satisfactory return in dollars and cents. The next day a friend invited me to take a drive to the residence of the party referred to, who owned three hundred and fifty acres of land and was reputed to be wealthy. It was a cheerless and uninviting place; house unpainted, no trees, shrubbery, or flowers to be seen, nothing to make the place home-like or attractive, except the corn and potatoes that surrounded it on all sides; just as if it had been dropped into the middle of the field, and, indeed, a path to it led from the public road, led to it through the plowed land, and through the corn. Such was the home of one who lived merely for making money. Years after I learned that he raised a family of daughters for whom society had no attraction, who all went to the bad, and gave him no comfort in his old age. As a rule in my travels, this is the result of my observation everywhere. Where I see a farmer who has no love for the beautiful, for flowers, for home comforts, and pleasant surroundings, I usually find no happiness, and unworthy members of society. I will not say that such are always the inevitable results, but the tendencies are in that direction. We should make happy homes and pleasant surroundings one of the objects of life, because it is not so much what we make, but how we spend it, that brings happiness.

Mr. **Harrison**. In going to and from my residence to the railroad in Germantown, I pass a number of small houses, and I notice that nearly all have flowers in their door-yards or windows, and where I see these, I know there is aspiration and hope in those homes. In England, in the city of London, there is a horticultural society composed of day-laborers, and artizans of the poorer class, who take great interest in the cultivation of fruits and flowers, and at a late exhibition over five thousand plants were displayed. There are also such associations in Lancashire, and some of the best botanists in England are to be found among the Lancashire weavers. In gooseberries, the prizes are usually carried off by the weavers, who grow the most beautiful specimens of "Crown Bob," "Roaring Lion," &c. Speaking of gooseberries, I will give, briefly, a method tried several years ago, with excellent results. Moisture is essential in growing this fruit, and after mulching the plants well with charcoal, I soaked hay in brine, spreading it under the plants on the charcoal. This double mulch absorbed plenty of moisture during the night, and I had no occasion to water artificially. I had a very heavy crop of the finest gooseberries, some as large as an ordinary plum, and as fine as grown in England.

Dr. **Wickersham**. I am glad to have this subject brought to the attention of our Association, and so ably and thoroughly discussed. There is nothing more worthy of our attention, and there are thousands of homes in our State that are sadly in need of information and encouragement on this question. I would like to see a copy of Mr. Moon's essay in the hands of every owner of a home in the State. I have never given much attention to fruit-culture, but I claim to know something about the culture of youth, and I can almost point out the children that come from homes where flowers are cultivated and appreciated. They are more cultivated, more polite, more intelligent, better clad, and superior in every way. It is one of the best ways for the elevation of our youth. The *beautiful* and the *good* are very closely related, and I can hardly discriminate between them. We need to agitate this question in our own county, in Berks, in every section of the State.

Mr. **Fox**. It is so many years since I have had any experience with a rural home that I cannot add anything to what we have already heard, but I am now trying to ornament and adorn a city home. Mr. Kendig of Manor is quite an amateur horticulturist; believes in a beautiful home and surroundings, and practices what he believes. I remember, with pleasure, a visit to his beautiful farm some years ago, and I hope we will hear from him on this subject.

Mr. **Kendig**. I am pleased to hear this discussion, and to know that the sentiment of our Association is so favorable to rural adornment. I am not a speaker, and if better able to address you, would cheerfully do so. I hope and believe this discussion will be productive of much good, and I heartily indorse the ideas advanced by the essayist and others. But little expense is necessary to improve the appearance of our farms and homes, while their value is greatly enhanced.

Mr. **Engle**. I am glad this subject is receiving the attention it deserves, and, having been advised to adorn and beautify our homes, I hope some of our members will tell us how, and what to plant. I hope Professor Meehan will give us some advice on this subject.

Mr. **WITMER.** Many of us would be glad to ornament if we knew how to make proper selections, and care for them when planted. I hope this part of the question will be more fully brought out.

Mr. **EBY.** I think many make a mistake in planting untried expensive novelties, and paying too little attention to our native trees and flowers. What is so attractive and so easily grown as our arbutus, columbine, and other native flowers? Many of them are more easily cultivated and more desirable than the most costly imported flowers, and will give greater satisfaction. I hope they will not be forgotten.

Mr. **MEEHAN.** Years ago, Mr. Buist told me some of his experience. A lady was admiring some handsome flowers he had in pots, and was offering for sale. He asked seventy-five cents for the plant, told her it was one of the most beautiful American cowslips, and was much admired. After discovering that it was a native plant instead of an exotic, it lost all interest for her, and she refused to take it. But a plant need not be an exotic to be beautiful. Nearly all our best and most desirable plants are natives, and we need not go to the florist or nurseryman to get beauty, if our means are limited. Our meadows, forests, and fields have beautiful plants in abundance, and we will be surprised at their increased beauty and attractiveness when domesticated and cultivated. We can begin with plants from the woods and fields, and as our tastes and experiences grow, we can try the rarer things that require more care and attention, and some money to buy. I often feel sorry that so many depend wholly, in their beginnings, on the nurseryman and florist. They plant Norway spruce and soft maple, while they can get prettier trees, and as much variety, in our own forests. There are many varieties of maple, and twenty to thirty of oak. Very few really know the value and beauty of the oak as an ornamental tree, and any, except the white oak, will grow faster than horse chestnut. I wish to call attention to another point referred to by the essayist. Trees do not exclude the circulation of air from our houses. Owing to the difference in temperature, there is more circulation of air about a building well shaded and surrounded by trees. In conclusion, I might add that home adornment is cheap and easily accomplished, and where nature furnishes so many facilities, and where the beautiful is so easily attained, why should we fail to have pleasant and attractive homes?

Mr. **HARRISON.** One of the most accomplished gardeners in America said once that if compelled to choose between native flowers and exotics, he would select the former. Some years ago, when in Italy, I saw cultivated there, as a pretty and rare plant, the common milk-weed, which we are glad to exterminate here as a pest. So we are, doubtless, cultivating many foreign plants as rare and desirable, which, in their native countries, are pestiferous weeds.

Mr. **HOOPES.** I am exceedingly pleased to see the great interest manifested in this discussion, and I hope it will be resumed again. In deference, however, to the amount of other business yet to be transacted, and the number of questions in the "Query-Box," I think we had better take up some other topic.

Mr. **HARRISON.** I hope we will proceed in regular order, as per our printed programme.

Mr. **HOOPES.** Before proceeding further, I beg leave to offer the following:

WHEREAS, This Association having heard, with deep regret, of the death of our esteemed honorary member, Charles Downing of Newburg, N. Y.; it is, therefore,

Resolved, That in the death of Mr. Downing, American pomology has sustained an almost irreparable loss, and years may intervene before a suitable successor will assume the position that he has so ably filled throughout a long life of gratuitous labor in the cause.

Resolved, That his kind, gentle disposition, purity of heart, unassuming manner, and love for the beautiful in nature, will long be remembered as an example rarely to be found, and greatly to be emulated.

Unanimously adopted.

The following question, "Canning *versus* Evaporating Fruit—Which is Preferable?" was next taken up for consideration.

Mr. **BALDERSTON.** The question of fruit-evaporating is an important one, and will be worthy our consideration. It has many advantages over canning, as it does not change the flavor or excellence of the fruit, especially apples. It is also more economical, as it involves no outlay for expensive glass jars nor even the cheaper, but more objectionable, tin cans. In evaporating fruit, it would be very desirable to have each variety dried, packed, and labeled separately with the name of the producer. This and other similar societies can aid materially in having this accomplished. One great objection to canning in tin is the danger of acid poisoning.

Mr. **DAVIS.** I am told that the chief danger is after opening tin cans and exposing the fruit to the air.

Dr. **RYDER.** When I first commenced canning, years ago, glass was expensive and tin was chiefly used. Glass is cheaper now, and we have not used tin for ten years. Evaporating has many advantages over canning, and one of the most important is the comparatively small bulk it occupies, and the ease with which it is transported from place to place. Red raspberries seem to lose quality and flavoring by evaporating, but black raspberries, apples, peaches, &c., if well ripened and properly evaporated, are preferable to the canned article. I think the idea advanced by Mr. Balderston in reference to keeping varieties separate is an excellent one, and I have advocated it for years. It is hardly practicable except in large orchards containing not many varieties. Bleaching seems necessary to realize best prices for fruit, but it is carried to excess by many and at the expense of flavoring and quality. I believe a reaction is taking place, and that there will be less bleaching with sulphur in the future. Last fall, Mr. Downing requested me to send him some fine evaporated fruit not bleached with sulphur, and I had great difficulty in obtaining it. Years ago we knew nothing of bleaching, simply drying the fruit quickly without sulphur.

President **STITZEL.** What varieties are best for evaporating?

Dr. **RYDER.** Almost any good cooking or baking apple will evaporate nicely, "Maiden's Blush," "Smokehouse," "Ewalt," "Domine," "Porter," and "Rambo" are good. "Fallawater" is too coarse grained.

Adjourned.

AFTERNOON SESSION—THURSDAY.

Mr. **HOOPES.** Before proceeding with the regular order, I wish to invite our members to send any new and handsome specimens of fruits to our Secretary to be illustrated in our reports. These illustrations add materially to the interest and attractiveness of our annual reports, and are no additional expense to the Association.

SELECTING A PLACE FOR NEXT MEETING.

Mr. Fox. I understand there is a disposition on the part of our members to move from one county to another with a view to an increase of membership. I believe such changes are advisable, and you are hereby invited to hold your next annual meeting in Reading. A cordial welcome is extended and every effort will be made to have a pleasant and successful meeting.

Mr. DAVIS. I heartily indorse and approve Mr. Fox's invitation.

Mr. ENGLE. I have no doubt that Reading is a good point for our meeting, and that it will be a success. There are also other desirable places, and as Harrisburg is most central and easy of access from any portion of the State, I name Harrisburg.

Mr. WITMER. In behalf of our agricultural and horticultural society, you are cordially invited to meet again in Lancaster. We will make every effort to do better than ever.

A ballot being taken, Reading was selected by the following vote: Reading, twenty-two votes; Lancaster, ten votes; Harrisburg, three votes.

THE QUESTION-BOX

Was next in order and a number of questions read and taken up for discussion.

1. "Why are high, hilly grounds, open to exposure, recommended as favorable for fruit orchards?"

Mr. HILLER. We find very few low situations that will grow peaches successfully. A north-western slope is best. The cold is not so intense, and less variable, on elevated positions than in the low valleys. Have often noticed a difference of ten degrees.

Mr. JAMISON. I agree with Mr. Hiller except as to the northern slope. I select high ground, but prefer a southern exposure.

Mr. DAVIS. My objection to a northern slope is, that fruit does not color so well, and is of inferior flavor.

Dr. FUNK. I prefer a northern exposure, as it is more certain to produce a crop. Would rather have less color than no fruit.

Mr. MEEHAN. Hillsides or elevated positions are not always best for orchards. Some of the best orchards in Bucks county are on flat lands. If low lands are well drained, they will do as well, or even better, than hillsides.

Mr. LONGSDORF. We always find a better growth of wood and healthier trees where well drained.

Mr. R. A. WICKERSHAM. In Adams county, the finest peaches are grown on elevated localities.

Mr. ENGLE. The question is, "Why are high locations recommended," &c, and it probably refers more particularly to peach orchards. Briefly speaking, it is because elevated positions are more regular in temperature, or less liable to sudden extremes. In the low valleys, the days are warmer, and the nights colder, than on the hills.

Mr. MEEHAN. Are not the most successful peach-growers and peach lands in the flat lands of Delaware and New Jersey?

Mr. ENGLE. In those States the temperature is more or less modified by the sea breezes, and consequently less variable.

2. "What is the cause of rust on celery, and how may it be prevented?"

Mr. SATTERTHWAIT. It is probably caused by being earthed up, either too wet or too dry.

3. "What is the cause of curl in the peach leaf, and what is a preventative or cure?"

Mr. MEEHAN. Like Sunday-school questions, some of these queries are rather hard to answer. I can only say as to "curl" it is caused by fungoid spores. These spores are always present, and require certain conditions of temperature for development. Peaches grown under glass are free from this disease. Mushrooms are similar in character. The spawn may be in the ground, but it requires certain temperature and conditions to make it grow. So all fungus requires some special conditions of soil and temperature, but just what they are I am not able to say.

Mr. HILLER. While I don't like to see "curl" on the peach, it seems to be no serious or permanent injury, and I pay little attention to it.

4. "I wish to plant 100 quince trees for market. What soil and location are best adapted, how far apart, and what varieties shall I plant?"

Mr. SATTERTHWAIT. I would plant Champion, though I have had good success with Orange. Would plant eighteen feet apart. Champion is a prolific and early bearer. I would train to a single stem on account of the borer, which is much worse on quince than on the apple. Any good soil will answer that is not too wet.

Mr. MOON. I think sixteen feet ample for quince. Champion colored finely this season, though not so well last year. Rea's Mammoth is not very productive. Of the new varieties, Meech's Prolific is the largest I ever saw.

Dr. FUNK. Have had experience only with Orange. My trees were planted eight years ago, fifteen feet apart each way. I head them low, and train to a single stem. I have one objection to the Orange: it ripens a little too early. I can get better prices later.

Mr. ENGLE. Champion is an early bearer of large fruit, but ripens rather late. I would not yet abandon Orange for Champion.

H. A. LONGSDORF. Early quinces usually command the best prices in New York.

5 and 6. "Grape rot—What is the cause and remedy? Which is the best white grape for general cultivation?"

Mr. DAVIS. This question was submitted by me, and I hope it will elicit some discussion. In Juniata county, we can hardly grow grapes on account of rot. They do not get soft and mushy, but dry up when about two thirds grown. I saw a statement recently, that it was caused by fungus, and that, after the fruit drops, the spores or seeds remain in the ground until the following season. The remedy proposed was to gather up all the fruit as it falls and remove or burn it.

Mr. MEEHAN. It is, no doubt, caused by fungus, and there must be some favorable conditions for its development, probably too much wet or moisture. It has been proven that covering the fruit with paper bags is a preventive, and a party in Ohio who thus protects his grapes never has any rot. He employs fifteen to twenty girls, and finds that it pays. In a general way, also, it is best to pay attention to the health of the vines by proper cultivation and pruning, and there will be little trouble with rot.

Mr. MOON. This question was discussed at the last meeting of New Jersey Horticultural Society, and covering the grapes with paper bags was strongly recommended. It was stated that bags cost one dollar and a quarter per thousand, and the cost of putting them on was about the same. It is the best means of protection against rot, insects, and birds.

President STITZEL. These statements agree with what Dr. Calder told us at Harrisburg several years ago. At first the bags were tied with strings, but afterward pins were found to be preferable. A careful estimate was made, and, after counting the cost of bags, pins, and labor, it was found to pay.

Mr. **ENGLE.** There is no question as to its utility, and it is surprising how early it can be done to advantage. If postponed too long, they may be injured by insects or the germs of disease may already be developed. There is some advantage in the kind of bags used. I had some made to order, with a "flap" on one side to lap over the other and keep out rain. Bags are also valuable in keeping grapes after ripening, as they will remain in good condition for a long time by being laid away in the bags in which they ripen.

Mr. **CHASE.** As to the best white grape, I know none that can be recommended for general cultivation in this State. Pocklington, Niagara, and Empire State are fine and do well in certain localities, but should be tested before planting extensively.

Dr. **FUNK.** Has any one present fruited Pocklington? I have, but find it hardly superior to a good Fox grape for eating.

D. E. **LONGSDORF.** Can Catawba be ripened and kept by bagging? It does not ripen any more in our locality.

Mr. **HEPLER.** I grew Concord and Catawba side by side, and cut some fine fruit second Monday in October. They were not protected by bagging, and I had no sign of rot.

President **STITZEL.** I was one of the first to use paper bags on grapes, in our locality, and did so, in the first place, on account of bees. Have, probably, twenty-five varieties, and "bagged" all, even Clinton, which we often leave on the vine until winter. I generally select only the finest bunches, and think the grapes thus protected are worth fully fifty per cent. more. The fruit is apt to be injured in putting on the bags, and not less than two-pound size should be used.

Mr. **HOOPES.** We find it necessary to bag all our grapes to secure from rot. The bunches are also more perfect and the fruit delicious in flavor.

THE APPLE-TREE BORER.

The following question was referred to Mr. Satterthwait at our last annual meeting, and the essay prepared by request: "How can we prevent the ravages of the apple-tree borer?"

The apple-tree borer has been so often described that its natural history and habits should, by this time, be familiar to every one who has paid any attention to fruit-growing. But it would seem from what was said at our last meeting that many are still suffering greatly from its ravages. Having, from long experience, become familiar with its habits, and the means of destroying it, I consented to prepare a paper on the subject. Like most other insects the apple-borer is local in its habits, being very bad in some localities, and none at all appearing in others near by. I judge from this that it is not given to long flights, and hence it is that it is not difficult, by persistent and thorough efforts, to rid a plantation of it almost entirely, when its habits are well understood; and with a perfect knowledge of these, the means of destroying it are so simple and obvious that I am puzzled to understand how it is that it should still be giving so much trouble.

The natural history of this insect is so simple, and it has been so often described, that it is amazing that there should still be so much ignorance amongst even intelligent fruit-growers as to its habits. I venture to say that scarcely one farmer in ten who grows apples, and suffers from its depredations, has ever seen the parent beetle that produces the apple-tree worm. And what is worse, very many have no idea that there is such a thing, and really have not the slightest idea how the worms get into the tree.

This may seem like a hard charge, and I would not make it if I did not know it to be true. For the benefit of these, it seems proper to say that this insect is a peculiar-looking striped beetle, from three quarters to seven eighths of an inch in length, which emerges from the tree, generally in the month of June, sometimes later, but always during the summer months, probably never later than July. Though a peculiar-looking and easily recognized insect from its rather bright brown and white stripes, it is very seldom seen, even where most numerous, from its habit of flying only at night, and keeping itself secreted through the day. The very few that I have ever seen, I have found just ready to emerge from their hole in the tree. This beetle deposits its eggs in the bark of the tree, generally near the surface of the ground, during the summer months. The egg thus laid soon hatches into a worm, which immediately commences business by eating through the bark, and working its way downwards, sometimes circling round so that two or three or more in a small tree will often completely girdle and kill it the first season. As it is probable that every female beetle lays from two to three hundred eggs, laying from one to four or five in a tree, it can be easily seen how soon a whole orchard may be destroyed by them, if nothing is done to prevent it. But, fortunately, the remedy is so simple and easy that it can do no serious mischief except by the most inexcusable carelessness. All that is required is to take out the worm, with the point of a knife, early in the season, or before it has eaten far. The slight wound then made will soon heal at that season of the year, without harming the tree. It is generally not difficult to see at a glance, from the discoloration of the bark, and the dirt worked out, where there is a worm at work. The time to do this is early in the fall, and, as it is very important to make thorough work and not allow one to escape, once going over is not sufficient.

I make it a rule to examine my trees three times between August and November. This is necessary, because the eggs of this insect are not all deposited, as some suppose, early in the summer, but are continued for two or three months, the first worms showing themselves early in August, but some not until two months later, and those first hatched would have done much mischief if left till that time. It is much better to examine your trees both early and late; by so doing, much more effectual work will be done, as some that may be missed the first time will be more easily seen later in the season.

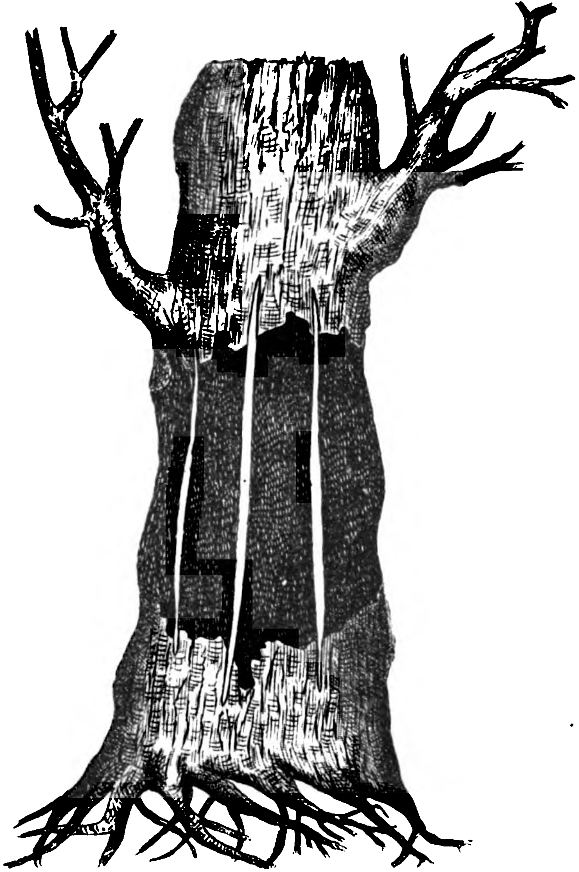
To facilitate this work and make it, in fact, a very simple and easy task, instead of a troublesome, laborious, and unsatisfactory one, it is only necessary, just before the time when the insect begins to deposit its eggs—about the first of June—to bank up the earth around the trunk of the tree from half a foot to a foot in height. The egg of the borer will then be laid so far up the trunk that the worm is easily seen and removed; but if this is not done, the egg will be deposited so low down that they will be much more difficult to see and take out, and very soon get so far down among the roots as to make it almost impossible to get at them. In a cultivated orchard this hilling is done with a shovel, but if in sod, sand or ashes may be hauled and placed around the tree; a few shovelfuls to each will be sufficient. When trees have been attended to in this way, it is not more than a day's work to go over an orchard of a thousand trees, take out the worms, and do the work effectually, and even if a few should escape, they can be easily seen and taken out afterwards, as the mound around the tree settles down with the weather, when without this they would be down amongst the roots and certainly escape.

I do not believe that any means of getting rid of the apple-tree borer ever has been, or ever will be, invented as easy, cheap, and effectual as this. Of course, there have been many, and will be many more, plans recommended, but I have not heard of any but what would require more time and labor, and then would not be effectual. To wrap the trunk of the tree with strong paper is one of these. This would be more labor, because it would still be necessary to bank up earth around the bottom to keep the insect from getting in under the paper, and it would certainly get in at the top if not tied tightly there. If this is done, the cord would soon cut in and injure the tree, and, after all, the insect would certainly lay its eggs somewhere in the tree, either in the trunk above the paper or in the crotches higher up, and the same or greater labor would be required to take them out. This plan is so palpably absurd that I should not have thought it worth mentioning if it had not been sanctioned by the high authority of Downing.

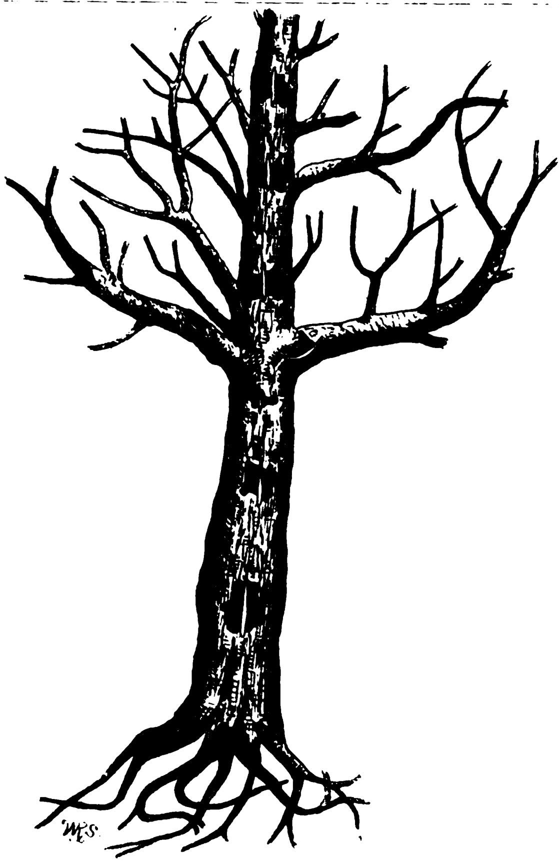
Many things have been recommended for washing or coating the trunks of fruit trees to keep out the borer, and very many have been swindled by venders of patent nostrums to prevent worms from destroying their trees. All these washes are humbugs, so far as keeping out the borer is concerned, and no application of the kind to the trunk of the tree will keep out the borer, but what would be very injurious to the tree, and the only effect would be, as in the case of the paper, to cause the insect to lay its eggs higher up in the tree. It may be well to say here that where this insect is bad, it does frequently deposit its eggs in the forks and among the branches of large trees, and to make thorough work of getting rid of them, it will be necessary to look after these; from the peculiar dirt they make dropping to the ground, they may be easily discovered.

Besides the apple, this same insect (*Saperda Bivatata*) attacks the quince, and the hawthorn, and mountain ash. It is much worse in the quince than in the apple, and I find it requires more care in looking after them, as the young worms seem to get deeper in the wood and their workings do not show so plainly on the surface as they do in the apple. It also requires good eye-sight to always detect them.

Having said all that it seems necessary to say in answer to the question "How to prevent the ravages of the apple-tree borer?" I might stop here, but, as there are many still who find they have to deal with it in the late stages of its growth, it will, perhaps, be well to pursue its history further. If not destroyed in its early stages, as should always be done, it goes on eating further in and working its way downwards, fast increasing in size and eating more rapidly as it grows, until it attains the size of about an inch in length. It then commences to burrow further into the tree and turns its direction upwards. It continues in this course a long while, making generally a straight hole in an upward direction, about half an inch from the outside of the tree, and working its chips behind it, leaving a hole almost as straight and smooth as could be made with a gimlet, from half a foot to a foot or more in length. After working in this course for a year or more, and the time approaching for it to make the great change of its lifetime, it begins to turn its attention to the outside world, and eats itself a hole straight through to the outer bark, leaving but a thin film of this to screen it from the gaze of impertinent outsiders. It has now attained its full size, about one and one quarter inches long, of a yellowish cast, much the thickest at the head and tapering to the outer extremity. Having now about completed this stage of its existence, and made every preparation for its exit from its long imprisonment, it rests quietly in the hole it has prepared, with its head at the opening, and undergoing the wonderful change which transforms it from a very ugly-looking worm to a rather comely-



SECTION SHOWING INCISIONS AS MADE.



TREE SHOWING BARK CANKER.

looking beetle, in which shape it comes forth to enjoy its brief period of a few weeks of freedom, and then lays its eggs and dies.

The regular period of the apple-borer, in the tree, is two years, though it is said to sometimes remain for three years. If not taken out the first season, it will be much more difficult to get at it and destroy it after that. A wire will then be useful in probing for it, and sometimes even a chisel and mallet will become necessary. But if thorough care is taken to have all your apple and quince trees banked up about the first of June, as directed, and they are attended to by going over carefully three times, at intervals of about a month, in the late summer and autumn, there need not one escape, and unless you have near neighbors that are careless, you need have but little trouble after that with the borer.

The peach-borer, which also attacks the plum, though entirely a different insect from the apple-borer, should be treated in the same way. It is much more easily destroyed, never eating far into the wood, and can always be detected without trouble by the gum oozing from the wound made by the worm.

I should say, before concluding, that the above remarks were intended to apply principally to the orchard, and it is proper to say that, in the nursery, the difficulty is far greater, as in practice it is difficult to keep nursery trees sufficiently hilled up all summer to prevent the borer from getting down among the roots of the tree, where they cannot easily be got at or destroyed. I think I should have been rid of the apple-borer almost entirely before this, if it were not for the difficulty of keeping them out of the nursery trees, and I would not advise any one to attempt to grow apple or quince trees largely in the nursery where the borer is bad; they will never pay for the trouble, as they can be grown much more cheaply and better in localities where they have not this trouble. But though this is the case in the nursery, it does not apply to the orchard, for, as I have said, the trouble of protecting an orchard from the borer is very slight when once its habits are well understood.

Mr. EBY. This essay is full of valuable information. I have had much trouble with the apple-tree borer, and though I examine my trees frequently and carefully I still find plenty. I have usually gone to the trouble and expense of wrapping the trees with paper, which I now learn could have been avoided. My orchard is near an old piece of timber, and I have found the borer not only on fruit trees, but on mountain ash, horse chestnut, linden, and maple, some of which have been actually destroyed. This is a very important paper to those in need of practical information.

Mr. MEEHAN. I am reluctant to make any comment, or take any exception, when Mr. Satterthwait gives the result of his practical experience. Few persons are more competent to speak authoritatively on this subject than he, and yet I think he has scarcely done justice to the plan, recommended by some high authorities, of wrapping paper around the trunks of the trees. I am confident it is a good practice when properly carried out, having tried it myself and found it very effective. I have also tried tar paper, and find it especially obnoxious to insects of all kinds. Have also tried the wire and jack knife, but prefer wrapping with paper, and consider it one of the best methods of preventing the borer's ravages.

Mr. SATTERTHWAIT. I do not see what advantages paper has over earth. The insect can still deposit its eggs, and if the entire trunk were wrapped, it would place its eggs in the branches.

Mr. J. W. THOMAS. I like Mr. Satterthwait's plan best, though neither will prevent the beetle from depositing its eggs somewhere. According to my observation, the borer seldoms goes any way but down or crosswise the first year. The second year it goes upward. Does it ever come out in less than two years?

Mr. SATTERTHWAIT. My experience is, that it only stays two years. Downing says it stays three years. I have seen trees that were entirely eaten except the bark, and have found the perfect insect in trees not much thicker than a lead-pencil.

The following question, referred to Mr. Meehan at our last annual meeting, was then briefly answered in a few verbal remarks:

"How can the usefulness and influence of our Association be best promoted and extended?"

Mr. MEEHAN. I don't know why this question should have been referred to me, as I feel that I have not been able to give it the time and attention its importance demands. Further, I am not an active member, merely an honorary member of the Association. I have, however, not missed an annual meeting in twenty-six years, or since our organization, and I hope I may be able to make a few suggestions that will aid us in promoting, in some way, the usefulness of our Society.

Originally, we were organized as a "Fruit-Growers' Society," and met wholly in the interest of fruit-culture. At that time, it was thought that to meet among ourselves and compare notes, our financial and mutual interests could be advanced, and that by publishing our annual reports, we could interest others, and increase our field of usefulness. The primary objects, of course, were to grow good fruits, not merely for their commercial value, but for the elevating and refining influences that are the result of such a calling. Now the public is becoming interested in our meetings, and enterprising, energetic newspapers send their reporters, who publish to the world our deliberations, long before they are printed in our annual reports. Not only are your local papers represented here, but correspondents of the Reading *Times*, *Bucks County Intelligencer*, Philadelphia *Press*, and New York *Tribune* are here, and will aid in giving our discussions wide publicity. Our annual reports, therefore, though more complete and full than formerly, are valuable, chiefly for reference, and are not so generally read as they would otherwise be.

With our annually increasing membership, came increased interest in our work, and it soon became apparent that our Society would be obliged to take in the whole range of horticultural science. Members began to realize that the whole measure and object of life was not to make money, but that to improve and beautify our homes, and aid in advancing the happiness of others were equally important duties. Entering this broader field of work made a change of name necessary, and now as a "Horticultural" instead of simply a "Fruit-Growers' Society," we must see how far we can improve the opportunities which our new, and more appropriate name embraces. It seems to me we may do good missionary work in enlisting the aid and influence of those who are with us in spirit, but who take no interest in our meetings. We want to get rid of the impression, which I know exists in some sections, that the only idea of this Association is to get the extra cent for a box of berries, or the additional dollar on a barrel of apples, and that our leading object in growing fine fruits and vegetables, and discussing them at our meetings, is to secure better prices for them. This idea has really often defeated the purpose of this Association, by antagonizing local growers, who believed our sole object was to excel them in producing higher priced-goods. We want to disabuse them of this idea. We want them to feel that these meetings and discussions are as much for their pleasure and benefit as for our own; that we always welcome their presence, and solicit their aid and experience in our deliberations.

We might also do a good work in encouraging, as much as possible, the formation of local horticultural societies. We can then go among them as assistants and fellow-students, rather than as teachers, and we can go also as invited and welcome guests. I think we might enlarge our scope of usefulness by having appointed a standing committee on local societies, and by having printed and distributed such suggestions and advice as would make clear our objects and intentions. There are many cases where local societies would welcome such aid and suggestions, not only for the pleasure they would have in receiving us, but from the satisfaction they would reap from the discussion of older members. Then, if we can have some of the best people in our town to take the lead in such matters in connection with a committee, as previously suggested, I believe it would aid us more than anything we have done in this direction for a long time.

Mr. MOON. Would it not be well to have larger editions of our proceedings for general distribution? Each member could distribute a certain number in his own neighborhood.

Mr. WITMER. Would not a liberal distribution of circulars, calling attention to our annual meetings, and giving a programme of the business to be transacted, be the means of awakening an interest in our work? Each member could distribute a number in his immediate vicinity, and encourage his neighbors and friends to attend.

Mr. ENGLE. I think we can increase our membership materially by the aid of the complete reports we now have allotted us for distribution by the State. Many would cheerfully pay the annual fee of one dollar for membership in consideration of receiving this report, if for no other reason.

Mr. MEEHAN. All the most interesting and important parts of our deliberations is published in the papers long before they appear in our official reports. The day has gone by when much value or interest will attach to our published proceedings. I think we can do more by personal attention and intercourse.

With a view of further distribution of the reports on hand, a motion was made and carried that each member present be authorized to take two copies.

On motion of Mr. Longsdorf, the Secretary was authorized to inform absent members that reports are ready for distribution, and that all who desire copies sent by mail be requested to send twenty-five cents for postage, in addition to the annual fee of membership.

On motion, the following question from the printed programme was postponed to our next annual meeting:

"Should our State establish a station for experiments in agriculture and horticulture?"

QUERY-BOX RESUMED.

7. "How can we prevent pear blight?"

The following letter, bearing upon the question, was read by the Secretary:

LANCASTER, *December 31, 1884.*

Mr. Daniel Smeych of Lancaster city desires to report to your Association that he has discovered what he believes to be an effectual remedy for pear blight.

His mode of treatment is simple, and has proved successful, with one exception, for a period of over ten years past, during which he has used it.

The treatment consists of making incisions, with a sharp-edged knife, *lengthwise* through the diseased part, cutting the bark through to the wood.

If the blighted spot is of the width of an inch or inch and a half, a single incision through the middle of it will answer. But if the blight is three or more inches in width, two or more incisions should be made, so that the bark is cut by paralleled incisions about an inch or inch and a half apart, always lengthwise to the trunk or limb operated on. This should be done as soon as the blight makes its appearance, except in winter, when it should be attended to early in the following spring.

The tree or limb operated on forms new bark underneath along the incisions, throwing off the black diseased bark in due course of time.

Mr. Smeych has tried the remedy, with good results, on more than twenty-five trees, varying from two to ten years old after planting.

The accompanying cuts show the manner in which the incisions should be made.

Respectfully yours,
SIMON P. EBY.

To E. B. ENGLE, Esq., *Secretary.*

Mr. MEEHAN. The gentleman, no doubt, has reference to bark canker instead of fire blight. They are very distinct and different in character. Fire blight often attacks healthy trees, and in a single night the entire top will be diseased, without any warning. Some recommend sulphur and lime as a remedy. Sometimes, when portions of the top only are blighted, the tree can be saved by removing the diseased branches. I think the best plan is to dig out the trees and plant again, as blight may not return for years. Of hundreds of pear trees on my grounds I have lost but one, a Dearborn's Seedling, by fire blight. Bark canker appears in large, hard patches on the stem or branches, and the remedy proposed by Mr. Eby will, no doubt, be effectual.

Mr. EBY. I am glad to be corrected on this subject, and there are, no doubt, others like Mr. Smeych who do not know there is a difference.

8. "When is the best time for pruning grape vines—fall or spring?"

Mr. ENGLE. Almost any time from fall to spring. Would never prune when frozen, or so late in the spring as to make the vines bleed. I don't know whether a vine will bleed to death, but it will lose considerable vitality from loss of sap.

Mr. LONGSDORF. I prefer spring pruning, because, if done in the fall, and a severe winter follows, it may be necessary to do it again.

9. "Should strawberry plants be covered in winter? If so, how?"

Mr. HEPLER. I never cover at all. In spring, after they have bloomed, I apply compost along the rows. I mulch with tan to keep berries clean.

Dr. FUNK. I usually cover two to three inches deep with fresh horse manure. I do not uncover in the spring, but let the manure remain as a mulch, and to keep the berries clean, as well as to keep down weeds.

Mr. ENGLE. I think it well to cover with manure for winter protection, and as a fertilizer and mulch. Am not afraid of getting the ground too rich.

Dr. FUNK. I am satisfied there is no danger of getting the ground too rich for a good field of berries. I like fifteen to twenty tons of manure to the acre. One bed treated in this way, three quarters of an acre, yielded one hundred and twenty-five bushels. They were mainly Crescent, Cumberland, Sharpless, Glendale, and a few Big Bob.

Dr. RYDER. Has Glendale proven satisfactory?

Dr. FUNK. It is sour, lacks flavor, and not a good shipper. Will discard it.

Dr. RYDER. With me it is very desirable for late cropping. It is not liable to rot, and is generally picked too soon. Sharpless and Cumberland are more liable to rot. As to mulching for winter protection, I think it desirable—I prefer well-rotted manure free from weed seeds.

Dr. **FUNK.** Without mulching, plants are likely to freeze out in low soils. Have had some to smother by being covered too deeply, but had a better crop than if all the plants had survived.

Mr. **HARRISON.** I always found it best to mulch in the fall, both as a protection from extreme cold and as a fertilizer for next year's crop. Have not done much in strawberries lately, but some years ago I kept a record of one variety, from which I grew two hundred and twenty-five bushels per acre.

10. "Biennial plants only die from exhaustion, so says floricultural authority. Question—Will red clover, burdock, or common mullein become perennial if divested of their flower-stalks, or are prevented from flowering in any other way?"

Dr. **FUNK.** In regard to clover, if we never remove the hay from our orchards it will renew itself continually.

Mr. **MEEHAN.** It is a well-known fact that if we prevent the aforenamed plants from going to seed, they will become perennial. This principle is well understood by the floriculturist, and such annuals as mignonette, petunia, and sunflower, if prevented from going to seed, will become perennial.

11 and 12 "What are the best varieties of sweet-corn for canning and drying, quality and productiveness considered?"

"How does sweet-corn compare with field-corn as food for stock, especially poultry? Also, how does it compare in value as fodder and for ensilage?"

Mr. **ERB.** I have a sweet-corn that I have grown for about thirty years. It is of most excellent quality, good size, and best I ever had for table use. Last season it had two to five ears on each stalk.

Mr. **HARRISON.** In 1854, I planted a sweet-corn named "Old Colony," which was the best I have ever used. After the second year I lost all the seed, and have not been able to get it since, until this season it is again introduced as a new variety. It is nearly pure white, and if as good for canning as for the table, it would be an excellent variety for that purpose. Stowell's Evergeen is a very good variety, but mixes readily with other kinds. Egyptian and Mexican are also good, the latter being a black variety.

Mr. **HILLER.** I have a large sugar-corn which I got about twenty years ago. It has a white cob, ten to twelve rows, medium-sized grains. It is one of the best varieties for canning.

Adjourned.

EVENING SESSION.

Having been called to order by the President, Mr. **HARRISON** offered the following in reference to the death of W. L. Schæffer, which was unanimously adopted, and the Secretary was directed to send a copy of same to his sister, Miss Elizabeth Schæffer, in Philadelphia:

Death has again taken from our Society one of its oldest and most devoted members, William Lehman Schæffer, of Philadelphia, who departed this life on the sixteenth day of August last, in the seventy-eighth year of his age.

Mr. Schæffer was a life-long, unselfish friend of horticulture, earnest and zealous in the cultivation of the fruits and flowers of the earth, wise and intelligent in experiment and practice, and whose generous contributions of time and money to the advancement of the cause are worthy of the warmest words of praise that language can bestow. The members of this Society hereby offer to his sister, Miss Elizabeth Schæffer, the heartfelt expression of its admiration of the many noble qualities of head and heart of their late fellow-member, and their deep sympathy and condolence in her great bereavement.

The following committees were announced:

Committee to Revise Fruit List.—H. M. Engle, W. H. Moon, Josiah Hoopes,H. A. Longsdorf, J. E. Jamison.

Committee on Constitution.—H. A. Chase, Thos. Meehan, W. H. Moon.

Committee on Exhibition.—Calvin Cooper, *Chairman;* H. M. Engle, Geo. D. Stitzel, E. Satterthwait, H. S. Rupp, J. Hibbard Bartram.

Mr. H. A. CHASE, chairman Committee on Nomenclature, submitted the following, which was accepted and ordered to be printed:

TO THE STATE HORTICULTURAL ASSOCIATION:

The Committee on Nomenclature, to which is referred the examination of the fruits and flowers on exhibition, respectfully report that they find:

William M. Pannebaker exhibits nine plates apples.
H. M. Engle & Son exhibits four plates apples.
West Miller exhibits four plates apples.
J. G. Rush exhibits three plates apples.
Casper Hiller exhibits nine plates apples.
L. S. Reist exhibits eight plates apples.
H. A. Longsdorf exhibits six plates apples.
J. E. Jamison exhibits five plates apples.
H. S. Rupp exhibits twelve plates apples.
George Balderston exhibits three plates apples.
George Balderston exhibits one package evaporated apples.

John Kready exhibits two new seedling grapes, Early Daisy and Keystone. Both appear to be very good keepers, and grapes of fair quality.

A. D Rohrer & Bro., collection of cut-flowers, (roses,) also *azalea indcia* in bloom.

The committee would call especial attention to the collection of ten plates of winter apples of Pennsylvania, exhibited by H. S. Rupp, named as follows: Great Bearer, Keim, Lancaster Greening, Fallawater, York Stripe, Strinetown Pippin, York Imperial, Cheese, Smith's Cider.

We would also call attention to the plate of Pyle's Red apple, a native of Delaware county, exhibited by George Achelis.

In William M. Pannebaker's collection, we find a plate each of two Pennsylvania apples, Ewalt, a native of Bedford county, and Major, a native of Northumberland county, valuable apples in their place of origin.

Henry S. Rupp exhibits pyramid, showing twenty-five varieties of Chinese primrose.

HOWARD A. CHASE,
H. A. LONGSDORF,
J. HIBBERD BARTRAM,
For the Committee.

PROFESSOR MEEHAN'S LECTURE.

President STITZEL. I now have the pleasure of introducing Professor Meehan, of Philadelphia, who will address us on "Fruits and Flowers, in Connection with the Progress of Civilization."

[Professor Meehan's address being entirely oral, and without any notes whatever, the following report must necessarily be very brief and incomplete.—*Secretary Pennsylvania State Horticultural Association.*]

Mr. **MEEHAN.** It is my purpose to try to show that a general love of horticulture pervades all classes of people, and has great influence in shaping their civilization, even though they seem unconscious of its existence. I do not mean those only who simply grow fruits and flowers for sale, or for the purpose of making a livelihood, but, in a broader sense, those who are interested in them for their own sake, and who have the will and the ability to make others happy; to instruct, and assist, and to do unto others as we would have them do unto us. The earlier civilization was of a different sort, and taught the people that each should do the best he could for himself, and that wealth and power were the great objects to be obtained in this life. We have advanced far beyond this point, and the best of us take pride and feel pleasure in doing anything that will promote the comfort and happiness of others. In this direction we have advanced wonderfully in a few hundred years. Mr. Downing, whose death has just been announced, was a remarkable example of one who devoted his life wholly for the benefit of others. Almost daily, baskets of fruits and flowers were sent to him, on which he cheerfully paid charges, so that he could examine and classify them for the information of others. He never failed to answer his correspondents, and though much labor and time were involved, he did so without pecuniary reward. In a recent letter, he informed me that he never made a dollar out of his valuable publications, but he sent his manuscript to the publishers, merely stipulating that he be given a few copies of the printed works for distribution among his friends. He was the embodiment of all that is good and noble in man, and horticultural pursuits no doubt had a moulding influence in the formation of his character.

As to the influence of fruits and flowers on civilization, we can, in many things, trace the history of man in his wanderings over the world through them. Take the quince as an example. It has never been known where it first grew wild, and, though its origin is now unknown, it has been known in all ages. From its Latin name, *Cydonia*, we learn that it was grown in Cyprus thousands of years ago, and when we go further back, even to the age of mythology, we find it has a history there, and that one of the tasks imposed upon Hercules was to get the golden apples from the garden of Hesperides, the walls of which were guarded by the gods. Investigation shows these "golden apples" to have been quinces. Their "marmalade" is simply the Spanish term for quince preserves, and it was one of the earliest fruits that was used by man.

No one knows where the cherry originated, yet it is found wherever the white man has been. We can trace it from Persia to Greece, thence to Rome, thence to Britain, to America, and all over the world. So with the Tuberose. No one knows where it ever grew wild, and yet, when we analyze its name, we get some clue to its history. Its Greek name, *Polianthes*, proves it to have been a "city flower" in the days of ancient Greece. We do not know its origin, but in all ancient religious ceremonies we know that flowers played an important part. The carnation, botanical name *Dianthus* (flower of the gods), was used in crowning the victorious conquerors of Rome. It did not originate in Rome. It was found growing on the walls in Great Britian when invaded by the Romans, and by them transplanted to Italy and made the emblem of their victories. These are a few of the facts to show how flowers were valued and the part they played in shaping the destinies of men and nations.

Coming to our own country, when first discovered by the white man, he found here many fruits and flowers cultivated by the Indians, and of which we are unable to trace the origin. Many had, no doubt, been lost and become extinct. The aborigines could give no account of how or when maize was introduced among them. They only know that they found it here, and by traces of it in their ancient mounds, and in their burial and sacrificial rites, are we able, to some extent, to trace the history and travels of the Indians themselves. The grape is now found wild everywhere. It seems to have been originally from Asia, though China and Japan have native varieties similar to our Fox grapes. It is probable that America was settled by Asiatics of a much more civilized race than the Indians who were found here when discovered by Europeans, and we can thus trace back the history of Indians far earlier than their discovery by Columbus. Some forms of plant-life seem to follow man without any invitation, and Doctor Gray, the noted botanist, said he could tell a man's nationality all over the world by the weeds that surrounded him. If every white man were swept out of existence to-day, the botanist could tell by the fruits and flowers surrounding him that he had been here, and where he came from. Thus I might go on for hours and give illustrations of the important part fruits and flowers have had in the civilization of all ages; but, to come nearer home, let us look at their influence in the settlement of new countries. Though gold, silver, and other minerals may often induce settlers, it is really the adaptation and capacity of the soil to produce fruits, vegetables, and flowers that exert the greatest influence. Take, for instance, California: although gold and silver were the first inducements to settlers, the cultivation of fruits and vegetables has done far more to develop her wealth and resources, and induce immigration, than her mines. So Florida, with her oranges and lemons. How many hundreds have been lured there to cultivate them, and with that cultivation came wealth and civilization. And the great North-West, with her wheat and grazing lands, these are the influences which tend to their settlement and development.

When the coffee plant was first discovered, all chances of taking plants were closely guarded and strictly prohibited. Some were taken to France, but they died, and so eager were the French to introduce it into the West Indies, that one gentleman divided his allowance of water on shipboard in order to keep a plant from perishing. From this successful attempt to establish one plant in Martinique came the many plantations which have built up such an immense coffee trade in the West Indies.

What an important and eventful history is connected with the introduction of the cotton plant into this country! With cotton came profitable slavery, because it was thought necessary to its successful cultivation. Then, after years of political strife and compromise, it was made the pretext for the greatest war of modern times, thus connecting it directly with the emancipation of the slave, and the progress of the human race. All as the result of the introduction of cotton at Jamestown about two hundred years ago.

And in ancient times, when the reports of giants in the land and other evils disheartened, the grapes from the valley of Echol, brought by Caleb and Joshua, put new vigor in the wanderers to the land of Canaan.

In our own day, we see some of the greatest acts of charity in connection with flowers. Missions are established in cities and towns, who take flowers to the poor and sick in the hospitals, where they often give more pleasure than money or delicacies could afford. In Paris, where we meet the greatest extremes of wealth and poverty, there are many who live and work in one small room, where light would seem the greatest blessing they could ask, and yet their small windows are often entirely hid with vines and flowers. You feel that such inmates, though poor, are not without virtue, and gifts of flowers would prove a better investment than donations of money, because their refining influence will inculcate lessons of thrift and industry.

My chief object has been to show what influence flowers have, and how much depends upon the love of flowers and horticulture in general. Two years ago, when in the North-West, I went among the Indians in Alaska, and, though warned not to go among a certain tribe, I found among them Captain Crittenden, of Kentucky, who, after the collapse of the Southern Confederacy, went to Alaska, and has ever since been living among the most savage tribes. He had a garden, probably twice as large as this room, and the only garden I saw there. The bond of friendship between them is found in the fruits and flowers he teaches them to cultivate. The untutored savages had learned to love him, and had been transformed into kind and peaceable neighbors, and I believe if the Government would pursue the same course with other tribes much good would result. We could probably civilize them as rapidly, and do them as much good by teaching them to raise flowers as by showing them how to raise something to eat. I believe that by utilizing this universal love of flowers we have one of the greatest levers in civilization, and if these few off-hand words I have said this evening will induce any of you to join in the good work I will be satisfied.

Dr. Wickersham. In behalf of the citizens of Lancaster who are present, and especially in behalf of the members of the high school, I move a vote of thanks to Professor Meehan for this interesting lecture. (Adopted.)

President Stitzel. There is still one topic on our printed programme that has not been discussed, and a very important one at that. I refer to the first question:

"Should horticulture be taught in our public schools?"

We will be pleased to hear from Dr. Wickersham on this question.

Dr. Wickersham. I noticed this on the list of questions, but took for granted there was some one on hand who would open the discussion. I have always felt a great interest in our public schools, and have been connected with them for many years. Although I have never given much attention to practical horticulture, I have for years advocated teaching in the public schools the elements of agriculture, and I have no doubt the study of horticulture might also be introduced to advantage, even if some of the branches now taught had to be excluded. There is much arithmetic now taught that is of no practical account, more abstract grammar that might as well be omitted, and some geography that could be dispensed with.

I have recently been elected a school-director. I have been principal of the State Normal School at Millersville, State Superintendent of Public Instruction, and Minister to Denmark, but none of these positions was more honorable than that of school-director. Many other positions are high and noble,—to superintend a railroad, or a manufacturing establishment, or a farm, is a noble calling; but none is more so than that which molds character into good men and women and into upright and honest citizens.

One of the ways to do this is to cultivate a taste for flowers and fruits. Instruction in botany might be given that would be far more interesting and valuable than to dwell so long on abstract grammar and arithmetic. The elements of entomology might also be taught, and would be far more useful than to learn the lengths of the rivers of Africa, or the heights of the mountains of Asia. Why not learn something about soils, and fruits, and flowers, and rocks? The elements of agriculture are taught in the German schools and in the schools of other European countries, and why should they not be taught here? I do not mean that a thorough knowledge of grammar and arithmetic are not important, but living, practical lessons should first be taught. Even in old Ireland I found in the schools a textbook in which were the elements of agriculture and horticulture, and are not we, in progressive America, ready for something of the kind?

In conclusion, Mr. President, allow me to say that I am heartily in favor of the judicious teaching of branches relating to agriculture and horticulture in our public schools. I see, present with us, Prof. Buehrle, superintendent of the schools of this city, and I hope we will hear from him on this subject.

Professor **BUEHRLE.** It seems to me the proper persons to speak on this subject are the farmers and horticulturists here assembled. If they feel the want of these studies, it is for them to say so. In most of our school-districts the time is limited. In Europe the school-term continues throughout the entire year.

In our agricultural districts here the school-term is four to eight months. There teaching is a profession, and the teacher employed for life. Here he is what some one has felicitously called a "tramp" and has "no abiding city." Until we are sufficiently civilized to give the teacher a permanent home, and have longer school-terms, there seem to be insurmountable difficulties in the way of teaching these branches in our public schools.

I fully agree that the elements of agriculture and horticulture would be of greater utility than much of the abstract grammar and geography that are taught, but as our educational system is now conducted, I see no immediate prospect of bringing about such a change.

The first great obstacle in the way is the inadequate preparation of the male teachers. The elements of horticulture and agriculture are well understood in the homes of the children in the rural districts, and woe to the teacher who should blunder in giving instructions in these subjects, hence only such as possess, not only theoretical knowledge, but practical skill, could be encouraged to attempt this work in our schools; but whence are such men to be obtained for our schools? This would seem to be all the more necessary since there is often considerable prejudice against all book-farming, as it is called. The second great obstacle is the employment of female teachers, very few of whom could be expected to study and learn the elements of agriculture and horticulture. How few of them can be prevailed on to study entomology! How often they tremble, if they don't scream, at the sight of caterpillers and spiders!

Of course the people are omnipotent in this matter, and if they say these subjects shall be taught, they will be taught, if not at once, at least very soon. Hence, as I said before, I came to hear the agriculturists and horticulturists talk and tell us what they want. We are now, even in this city, teaching a little of plants and animals, also somewhat of minerals and chemistry, merely pointing the way; preparing the mind of the people for scientific studies. To further this work, some of our teachers have constituted themselves a class for the study of botany, and this will excuse me when I take the liberty of suggesting that the proper place to begin this work is in the normal schools, where they pay special attention to the preparation of teachers.

Mr. **HARRISON.** I left school when I was fourteen years old, and had been taught on the old system of indoctrination, or hammering, crowding, and pressing into the mind, instead of educating, drawing out, or *educing* original ideas from the mind. Another system of teaching was the monitorial or Lancasterian, where each monitor received instruction from the principal, and then taught others, a great improvement on the old scholastic method. I would have no head or foot of classes in schools, but would conduct them on the principle of King Arthur's round table, which we read of in history, where the king and his knights had equal rights. I think great injustice is often done, perhaps not intentionally, by placing certain children at the head of the school, while others, just as diligent, but who acquire ideas less readily, are discouraged by demerit marks and a lower position in the class. For competition I would substitute mutual aid. I think it an excellent idea to encourage pupils to ask questions. I have adopted this plan in my Sabbath-school class, and tell my boys when they come again they shall be prepared to ask any questions. When they see a stone, or a beautiful plant or flower, to ask me what it is, and thus, if I am unprepared to answer their questions, doing me a greater favor by making a student of me in causing me to inform myself about it that I may answer them at the next lesson. The spider's web, surveyor's tripod, and other subjects were topics that brought out a number of practical and interesting questions. On another occasion, I took some boys to Fairmount Park, and after telling them the names of twenty-one varieties of trees, told them to name all they could the following day, and one of them remembered nineteen of the twenty-one. It is the teaching of practical things that induces pupils to think, and brings out original ideas. I was much struck with a remark once made by Edward Everett, that "the boy who can read, write, and cipher has all the elements of the best education the world affords," or words to that effect. All we want is to give the boy the tools, teach him how to use them, and let him work out his own success.

Mr. **Meehan**. This is a question in which I am much interested, being a member of the school-board, in Philadelphia, and chairman of the committee of common council on schools in our city government. Being a friend of horticulture, and having devoted much time to its study, it might be supposed that I am in favor of its being taught in our public schools; but such is not the case. I find in our State Board of Agriculture they think agriculture should be taught in our public schools. Our horticultural societies urge instruction in horticulture. Scientific associations say "introduce science," physiological bodies favor hygiene, each favoring its own specialty. My own opinion is that we can do but little more than we are doing at present. The whole matter is a question of time for the children and of money for the taxpayers. With one hundred thousand pupils in the city of Philadelphia, and an annual expenditure of one million dollars for our schools, teachers are already over-worked and taxes excessive. We should endeavor to teach children to "help themselves," to educate themselves, by teaching them to think for themselves, and by giving them practical ideas of industry and business. I have found, in my observations in life, that some of our best men are those who have had no special educational advantages. As a rule, they left school early, and devoted themselves to some active practical calling.

I do not know how far my own example is of any value, but I have learned far more by my own personal efforts than I ever acquired in school. A leading member of the largest shipping firm in Philadelphia has been in his father's counting-house since he was thirteen, and is one of our most enterprising and successful merchants.

While a knowledge of horticulture, in a general way, would doubtless be an advantage, I certainly should not recommend its being introduced as a regular study in our public schools.

Dr. **Wickersham**. After what has been said, I feel it almost a duty to restate my position. While I am in favor of teaching the elements of horticulture in our schools, I would advocate it only in a very general way. If we have teachers who have such knowledge and could impart it, I would have it taught orally, and not from books. I would encourage and teach a love for horticulture, for the beautiful in nature, rather than to teach horticulture as a science, and to this, I am sure, my friend will have no objection.

Mr. HOOPES. Before adjournment, I beg leave to offer the following:

Resolved, That the thanks of this Society are extended to the officers and members of the Lancaster County Agricultural and Horticultural Society for providing a commodious and comfortable hall for our place of meeting, for uniform courtesy and kindness to our members, and for the pains they have taken to increase the interest in our sessions, and advancing the cause to which we as a Society are pledged.

To the press of the city of Lancaster, and especially to the gentlemen who have so kindly and fully reported our proceedings, and to the citizens generally who have aided us by their presence and counsel, we feel under deep obligations, and desire them to accept our heartfelt thanks.

The resolutions as read were unanimously adopted; whereupon the Association was declared adjourned.

CONTENTS AND INDEX.

Page.
Constitution, 1
By-Laws, 2
Officers for 1885, 3
Committee for 1885, 5
Life and honorary members, 6
Annual members, 7–8
Introductory, 9
Address of welcome and response, 10
Treasurer's annual statement, 11
Reports of special committees, 12
Location for orchards, 13
Amendment to Constitution, 13
General Fruit Committee—report of Chairman Fox, 14–20
Discussion, 20–23
List of fruits for Pennsylvania—report of Mr. Chase, 23–27
Discussion, 27–28
Insectivorous Birds—report of Mr. Rutter, 28–30
Officers for 1885—nomination and election, 30
Annual address—Vice President Engle, 31–35
Pacific coast, fruit industries of, 35–40
Discussion, 40–41
Keim apple, history of, 41–42
Committees, appointment of, 42–43
Potatoes—Discussion, 43–45
Horticultural Adornment of Rural Homes—essay by Mr. Moon, 45–48
Discussion, 48–50
Charles Downing—resolutions of respect, 51
Discussion—Canning *versus* Evaporating Fruit, 51
Reading, Pa., next annual meeting at, 52
Question box—Best Location for Orchards, 52
    Celery—cause of Rust, 52
    Cause of Curl on Peach, 52–53
    Quinces, best varieties, &c., 53
    Grape Rot, cause and remedy—best White Grape, 53–54
Apple Tree Borer—essay by Mr. Satterthwait, 54–57
Meehan, Thomas, remarks by, 58–59
Query box—Pear Blight, 59–60
    Grape Vines, best time to prune, 60
    Strawberries—winter protection, 60–61
    Plants, Biennial and Perennial, 61
    Sweet Corn—best varieties for canning, &c., 61
Schaeffer, William—resolutions of respect, 61–62
Committees announced, 62
Committee on Nomenclature, report of, 62
Prof. Meehan's lecture, 62–65
Horticulture in our Public Schools—remarks by Dr. Wickersham, Prof. Buehrle, Mr. Harrison, and Prof. Meehan, 65–68

REPORT

OF THE

Pennsylvania State Dairymen's Association, 1885.

LIST OF OFFICERS.

President.

A. M. FULLER, Meadville, Crawford county.

Executive Committee.

WILLIS P. HAZARD,	1st Vice President, .	West Chester, Chester county.
JOHN FULLER,	2d Vice President, .	Harmonsburg, Crawford county.
LEON C. MAGAW,	3d Vice President, .	Meadville, Crawford county.

Secretary.

R. H. ODELL, Meadville, Crawford county.

Treasurer.

J. H. LENHART, Meadville, Crawford county.

Vice Presidents.

I. P. Thomas,	Delaware county.
Milton Darlington,	Chester county.
S. S. Spencer,	Lancaster county.
J. C. Sibley,	Venango county.
A. D. Beatty,	Crawford county.
John Cole,	Crawford county.
Asa R. Sturtevant,	Crawford county.
W. G. Moore,	Berks county.
Col. P. B. Carpenter,	Crawford county.
M. H. Terry,*	Erie county.
G. W. Carroll,	Erie county.
Hon. M. C. Beebe,*	Venango county.
Alfred Paschall,	Bucks county.
H. H. Harper,	Crawford county.
George Blight,	Philadelphia.
Joseph E. Gillingham,	Montgomery county.
Prof. W. H. Jordan,	Centre county.

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*Since deceased.

CONSTITUTION

OF THE

PENNSYLVANIA STATE DAIRYMEN'S ASSOCIATION,

Adopted April 13, 1871, Amended January 18, 1882.

SECTION 1. This organization shall be known as the Pennsylvania State Dairymen's Association.

SECTION 2. Its purpose shall be to improve and develop the dairy resources of Pennsylvania.

SECTION 3. Its membership shall consist of such persons as shall pay into the treasury the requisite fees, and of honorary members. The fee for permanent membership shall be one dollar, and for annual membership fifty cents.

SECTION 4. Its officers shall consist of a President, Secretary, Treasurer, and twenty Vice Presidents.

SECTION 5. The Executive Committee shall be composed of the president, secretary, treasurer, together with the first three vice presidents, and shall have the oversight of the affairs of the Association, the appointment of its meetings, and all arrangements for the same, including the annual meeting for the election of officers.

SECTION 6. It shall be the duty of the Secretary to keep and prepare for publication the transactions of all meetings of the Association each current year, embracing such papers as shall be approved by him. The Treasurer shall keep the charge of the funds of the Association, and shall disburse the same on the order of the Secretary, countersigned by the President, and shall report receipts and disbursements at the annual meeting.

SECTION 7. Amendments to this constitution may be made at any annual meeting, by a two-thirds vote of the members present.

ELEVENTH ANNUAL MEETING

OF THE

PENNSYLVANIA STATE DAIRYMEN'S ASSOCIATION,

Held at Meadville, Pa., February 3 and 4, 1885.

The eleventh annual meeting of the Pennsylvania State Dairymen's Association was held in the court-house, at Meadville, Pa., Tuesday and Wednesday, February 3 and 4, 1885. The first session opened at two o'clock, P. M., February 3, with several hundred dairymen and other farmers from various parts of the State in attendance.

President A. M. Fuller, of Meadville, called the meeting to order and appointed committees, as follows:

Finance.—H. W. Canfield, J. B. Phelps, D. H. Gibson.
Dairy Utensils.—R. C. Ferry, J. L. Wykoff.
Bureau of Information.—H. Cooley Greene.
Resolutions.—Willis P. Hazard, George Spitler, H. Cooley Greene.
Auditors.—E. W. Shippen, John Cole.

The Treasurer, J. H. Lenhart, being confined at home by sickness, Secretary H. Cooley Greene read the Treasurer's report, as follows:

TREASURER'S REPORT.

J. H. Lenhart, in account with Pennsylvania State Dairymen's Association, for the year ending February 3, 1885.

DR.

To cash balance on hand,	$171 04	
To note, John Fuller,	76 18	
To cash for membership,	17 75	
To State appropriation, (1883,)	350 00	
To State appropriation, (1884,)	350 00	
		$964 92

CR.

By cash paid I. P. Roberts, lecture,	$75 00
By cash paid E. L. Sturtevant, lecture,	30 00
By cash paid F. A. Striffler, banquet,	63 00
By cash paid W. P. Hazard, lecture,	27 25
By cash paid K. T. Mead, stenographer,	25 00
By cash paid Republican office, printing,	14 90
By cash paid freight on reports,	7 15
By cash paid envelopes and postage,	11 10
By cash paid H. C. Greene, Secretary,	75 00

By cash paid E A. Hempstead, printing,	$12 50	
By cash paid R. H. Odell, printing,	2 00	
By cash paid Frank Braymer, janitor,	5 00	
By cash paid A. M. Fuller, expenses as delegate to spring meeting,	39 35	
By cash paid T. W. Grayson, printing,	2 00	
By cash paid L. S. Hart, printing special report,	30 19	
By cash paid Waterford Leader, printing,	2 00	
By cash paid Erie Observer, printing,	2 00	
By cash paid Titusville Herald, printing,	2 00	
By cash paid Cochranton Times, printing,	2 00	
By cash paid Linesville Herald, printing,	2 00	
By cash paid Union City Times, printing,	2 00	
By cash paid Conneautville Courier, printing,	2 00	
By cash paid Cambridge News, printing,	2 00	
By cash paid J. H. Lenhart, express and postage,	3 75	
By cash balance on hand,	525 73	
		$964 92

J. H. LENHART, *Treasurer.*

On motion of E. W. Shippen, report received and placed on file.

REPORT OF AUDITORS.

To the President and Members of the Pennsylvania State Dairymen's Association:

Your committee, appointed to audit the accounts of your Treasurer, respectfully report that they have examined said accounts and find them correct in every particular, with proper vouchers for all amounts reported paid out.

E. W. SHIPPEN,
JOHN COLE,
Auditors.

REPORT OF THE SECRETARY.

Gentlemen of the Association:

I am here without a written report. As is known to you all, I am with you at the annual meeting, and little besides that. The business of the Secretary is chiefly done by the Assistant Secretary—who has his office in Meadville—the Treasurer and Assistant Secretary. I have no formal report to make.

I will say that during the past year it seems to me that we have reason to feel gratified with the outlook. The outlook for the dairy interest has certainly not become more cloudy or dark during the past year. The time has been when the dairymen felt that they were being overwhelmed by different things; but those bug-bears have largely disappeared, and especially during the present depression, when there is heavy depression in every branch of manufacturing industry in our country, the dairy stands alone unaffected.

We cannot say that there is a depression in the market value of dairy products. Cheese is bearing a good price; butter is bearing a good price (that is, good butter.) The prospects for the dairy are better than the prospects of the wheat-grower, and, as dairymen, we have reason to congratulate ourselves that we have chosen a branch of agriculture that is the last to come down to rock bottom, the last to feel a financial crisis, and the first to recover from it.

Vice President Leon C. Magaw was called to the chair, relieving President Fuller, who delivered the annual address, as follows:

ADDRESS BY THE PRESIDENT, A. M. FULLER.

MEMBERS OF THE ASSOCIATION, GENTLEMEN: Several years have elapsed since I was called upon to deliver the opening address of the Association.

These years have wrought great changes in the dairy industry in this State. North-western Pennsylvania, where associated dairying was first introduced into the State, and which gained for her so enviable a reputation for the production of fine cheese, is now called upon to divide the honor with eastern Pennsylvania.

The creamery system adopted in the eastern part of the State has resulted in the building of many cheese factories, and though it has not added greatly to the reputation of Pennsylvania cheese, it has been rendered profitable by the production of fine butter.

Dairying embraces the production of both cheese and butter, and as a dairymen's association, we extend to our eastern brethren congratulations over the progress they have made in the manufacture of dairy products.

I take pleasure in stating to the Association that since our last annual meeting, held in this city, February, 1884, a very interesting spring meeting of the Association was held in Doylestown, Bucks county, May 22 and 23. The meeting was well attended, the papers presented were exceptionally good, and the discussions of the subjects presented were not only interesting, but profitable to the members. I trust that the spring meeting of 1885 will also be held in the eastern part of the State.

In reviewing the dairy business for the past year, I think it can be said that the business has been fully as profitable as any other branch of farming.

I quote from *Bradstreet's Journal of Trade*, a most excellent authority, as follows:

BUTTER.

"The dairy interest is, at the present time, the most stable and prosperous department of agriculture. Its history is one of gradual and solid expansion, there having been no single year in which unprecedented progress has not been made. The lowest prices for the past seven years ruled during July, 1879, when they reached the lowest level since 1861. During the early months of the season, say from May until the end of September, butter sold below the cost of production. The low prices gave a great impetus to our export trade, which resulted in a marked advance in value during November and December, and continued to steadily advance year by year until 1883. The past year has been phenomenal for the low prices which ruled during the last two months, they being lower than for the corresponding period of 1879. This is a curious fact, and worthy of consideration, as last year the State act prohibiting the sale or manufacture of oleomargarine came into force. It was naturally expected that the passage of this act would increase the value of genuine butter. If this was the intention of its framers they have been much disappointed. Those interested in dairy products maintain that, under the present favorable circumstances, the country can produce more of the genuine article than it can consume. If, however, we had a short make, prices would become almost prohibitory. They account for the prevailing low prices by pointing out that the production this season has increased from fifteen to twenty per cent. In New York State alone, there has been an increase of ten to fifteen per cent., the open weather adding six weeks to the season's make. The depression in manufacturing centers has also had its effect upon prices; however, all things considered, it has been a profitable and fairly satisfactory year. The receipts, exports, and stock at new year compare as follows, with those of last year:

RECEIPTS.

1884.	1883.	
1,552,947 pack.	1,554,519 pack.	Dec. 1,572 pack.

EXPORTS.

1884.	1883.	
317,312 pack.	376,228 pack.	Dec. 58,916 pack.

STOCKS.

Jan. 1,1885.	*Jan.* 1,1884.	
82,093 pack.	74,281 pack.	Inc. 7,818 pack.

CHEESE.

The make of cheese in 1878 was exceptionally large, the consequence being that excessive stocks were carried over to 1879, when finest State factory sold at five and three quarter cents. This was the lowest price recorded for twenty years. The low prices prevailing at that time had the effect of introducing cheese into places hitherto unknown. The demand increased to such an extent that before the close of the year as high as thirteen cents was paid. The most remarkable feature in the cheese trade is the rapid development of the Canadian production. The exports from over the border have increased about twenty-five or thirty per cent. every year, until they now approach very nearly to that of this country, and if they continue, which in all probability will be the case, they must very soon exceed them. Canadian cheese is rapidly replacing American in foreign markets. The production of this State is, it is maintained, deteriorating, complaints having been made that certain factories, which stood high in the estimation of the trade, have this year abused their good name by "skimming." This cannot continue if we are to keep our foreign markets, for it is these that take our best makes. The present year's trade may have been fairly satisfactory to the producers, but receivers have had far from a good year.

The receipts, exports, and stock of cheese compare as follows with the previous year:

	Packages.		*Packages.*
Receipts, 1883,	2,456,232	Exports, 1883,	1,957,957
Receipts, 1884,	2,407,550	Exports, 1884,	1,932,702
Decrease,	48,682	Decrease,	25,255

In this section, I regret to say that the yield of dairy products is decreasing, and I would suggest that a discussion of the cause of the decline of dairying in the western counties of the State might be profitable to us. I believe that the main cause is the lack of stability on the part of dairymen, and the decline is due largely to the half-hearted way in which even our best farmers have followed the business. To render a business profitable, it must be equipped and furnished with every means necessary to its highest efficiency. Few business enterprises succeed which are conducted upon an experimental basis.

Dairying as a business cannot be properly judged by the experience of one season, or the failure through mismanagement of a few factories. In order to prove the correctness of the statement, it is only necessary to point to dairy sections in other States where dairying is followed as a business, and not merely as an experiment, and has been carried on successfully for generations.

Let us, therefore, renew our efforts, correcting errors wherever they exist, and improve the natural advantages which are so largely in our favor for the successful prosecution of the dairy business.

I desire very briefly to call your attention to the objects and purposes of this organization. One of the main objects of this organization is to bring together those engaged in agriculture, and especially those interested in dairying, and, by the interchange of experience and practice, to benefit all engaged in these pursuits. I may say that no class in the community stands so much in need of the benefits which proceed from coöperation as the farming class. You are a power socially and politically. It requires organization, however, to make your influence effective. I remind you that it was by your united efforts that we were enabled to secure a representative in the Legislature. The more thoroughly you coöperate, through farmers' clubs, and in such organizations as this, the more surely can you make your influence felt, and secure to agriculture the recognition which is due it. This, as you are aware, is our eleventh annual meeting. There are some here to-day who will recall to mind the many interesting and instructive meetings which have been held under the auspices of this Association in the past, and which we trust have exerted a wide influence for good, in the State Agricultural Report, of which there are twenty-five thousand six hundred copies issued annually.

There is scarcely any subject connected with agriculture that does not interest the dairyman, hence our field of usefulness is not limited.

During the past year, we have labored to secure an agricultural experiment station in this State, and have given aid and information to our representatives in the Legislature, which should result in securing to this State an institution which will be useful to us.

The subject of oleomargarine, intimately connected with dairying, will also claim our attention, and calls for our assistance in aiding legislative action on this important question. Prohibitory laws have already been adopted in New York State and New Jersey, and it is desirable that whatever action is taken by our State shall be wise and just.

A road law for Pennsylvania is also a matter which interests dairymen as well as all citizens. "The road to the cheese factory is none too good," and we may be excused for giving a little attention to this sadly-neglected subject.

There are many other subjects worthy of being named in connection with the usefulness of this organization in advancing agricultural interests. If we succeed in establishing an agricultural experiment station in this State, it will open an inexhaustible fund of subjects which can be discussed more profitably by farmers' organizations than in any other way. Let me urge upon you, therefore, more thorough coöperation, and an improvement of every opportunity offered for gaining a better understanding of improved methods and practices in your particular business.

The Executive Committee of the Association have invited eminent speakers to address us on this occasion, and we trust all will aid in making this an interesting meeting.

DISCUSSION.

After the delivery of the address, an opportunity was given for the discussion of the points presented. Mr. H. Cooley Greene suggested the necessity of more activity in dairy matters. A more effectual organization will have a beneficial effect upon those interests. Everywhere there are dairymen, but they are not organized in behalf of their own interests. From organized efforts there will be much growth.

The CHAIR. Gentlemen: You have heard this interesting address which has touched upon points interesting to all. Individually, I have endeavored to keep myself posted, but must say that from this address I have obtained particulars which I have failed to get from any other source. *Bradstreet's* is the most prominent institution of the kind in the United States. You have the particulars obtained from it. You have heard the remarks in regard to the experiment station. The matter is to be brought before the Legislature, and I take the liberty to give you an opportunity to discuss the matter if it is proper to do so here.

H. C. GREENE. Mr. Chairman and Gentlemen: I do not feel qualified to interest you very much on the subject which is before us, but I do feel that this meeting ought to discuss it, and give special thought to the matter. It was in this section of the State that dairymen first began to work together. It was in this county that they first joined hand in hand. Organized effort has been confined to this section of the State. What we want in this matter is organized effort, and to stand shoulder to shoulder. In those sections of the State where there are no dairymen, they are utterly ignorant of what is going on in the dairy world; ignorant of dairy literature. Their attention has not been called to these matters, and it is the chief business of this Association to extend this organized work. It is not necessary to produce arguments to show that organized endeavor is more effective than individual effort. We know that. There is not one here who questions the fact. The existence of the Pennsylvania State Dairymen's Association is going to hinge upon the fact of its usefulness. We need increased effort to extend our influence where there is no organized effort. We have not reached into every part of the State, or into every section where there is a dairy. Breeding stock is not exactly dairying, but you can hardly breed stock without being a dairyman, and can hardly be a dairyman without breeding stock.

President Fuller resumed the chair, and introduced Prof. I. W. Chamberlain, President of the Ohio Board of Agriculture, whose subject was

FARMERS' INSTITUTES—THE GOOD AND BAD FEATURES OF DAIRYING IN OHIO.

Mr. CHAMBERLAIN. Gentlemen of the Pennsylvania State Dairymen's Association: I have been requested by your President to address you on the above subject. I shall treat it mainly from the farmer's stand-point. A full statement of the good and the bad features of Ohio dairying would be, in effect, a history of the development of agriculture in that State, since dairying on a large or small scale has existed from almost the first in nearly all the counties, and had more or less influence on their agriculture. Especially was this true in the chief dairy region of the State—the Connecticut Western Reserve. A history of the development of dairying in that region will reveal the following bad features, which I will treat first, and then notice some of the good, or more hopeful features:

First. Wastefulness, or loss of feed; of manure; of stock; of calves;

of quality of the product, and, hence, of prices; of time; and of moral force among the dairymen.

The Western Reserve of Ohio comprises ten counties and parts of two others, lying in the north-east corner of the State, north of forty-one degrees north latitude and east of about eighty-two degrees fifty minutes west longitude. The counties are Erie, Huron, Lorain, Cuyahoga, Medina, Lake, Geauga, Ashtabula, Trumbull, and so much of Summit and Mahoning as lies north of latitude forty-one degrees. This is not a political division, but simply historic as to its land titles and early settlers, and the line is now nearly obliterated, except as a historic one, and as pretty nearly the limit of the main dairy region and the Connecticut origin of its inhabitants.

Character of Soil.

The soil of these counties is drift or bowlder clay, a part of it underlaid by shale rock, and a part by sandstone. The whole area lies in what is known by geologists as the glaciated portion of the State, that is, that portion which, ages ago, was subjected to the leveling, sub-soiling, and disintegrating action of the great glacier that slowly formed and pressed southward over the entire State, except about twenty-five south-easterly counties, and then slowly melted away. The proofs of this ice action are well known by a more level and fertile soil than in the non-glaciated portions; bowlders of erratic foreign stone; grooves or striæ cut in the top of the "rock in place," all running in a south-easterly direction; and the chemical analysis showing copper, doubtless from the Lake Superior region. This bowlder clay bears proofs of being largely of transported material, gathered up in the progress of the great glacier. Hence it contains all the elements of a fertile soil, having an abundance of lime in soil and subsoil, even where limestone is not the underlying rock.

The original settlers found this region heavily wooded with beech, maple, hickory, elm, ash, poplar, cucumber, &c., on the more clayey portions, and with walnut, butternut, oak, &c., on the more sandy portions, these timbers blending more or less as the clay blended with the sand.

As the timber was cleared off from the more clayey portions, which constitute, perhaps, three fourths of the entire Western reserve, a dense herbage of blue-grass spontaneously sprung up. Stumps and roots made tillage difficult, and the soil was a stiff, damp clay, not sufficiently drained from beneath for successful cropping under a rotation of cereals, roots, and grasses. Further than this, transportation was difficult, markets were distant, butter and cheese were more condensed than grain and could be taken to Lake Erie and sent east, or to the canals or the Ohio river and sent to Pittsburgh, Cincinnati, St. Louis, or New Orleans. These causes combined to stamp the character of the Western Reserve as a dairy region. So largely was dairying the main specialty that this region gained, and still retains, the sobriquet of "Cheesedom."

Large dairies of twenty to sixty, or even eighty, cows were kept and the cheese and butter were made up in a dairy-house on each farm, and were usually of fairly good quality.

Early Wastefulness.

The *waste of feed* was of two general kinds—increased consumption from failure to shelter the cows properly, and actual waste of fodder from feeding on the ground. Since these bad features are not yet wholly corrected in the stock regions of Ohio and neighboring States, it may be well to dwell a moment on them. The first office performed by food in the animal system, science teaches, is to keep up the animal heat. Digestion is a slow combustion and food is the fuel of the system. Hay, in early times, was almost universally stacked or stored in small hay barns where it grew, and the cows fed around the stacks or barns, standing out-doors by day and lying out by night on snow, mud, or frozen ground. Hence in storms or severe cold of winter the entire hay, and even grain, fed was used up by the cows in keeping up animal heat—sustaining animal life. The cows gradually grew poor all winter. Carbon they must have to maintain the necessary animal heat to withstand the wintry blasts, and as the hay fed did not supply it rapidly enough, they constantly drew on the stores of fat in their own systems, almost pure carbon. They ate enormously, but grew poor in spite of all, so that many a cow-hide adorned the fence before spring. It was a standing joke that the first crop the dairyman turned into cash in the spring was his crop of cow-hides. Lack of shelter thus caused enormous increase in the consumption of food and a great loss of flesh and life. Later on in the summer, grass that should have gone into milk was used in replacing this needless waste of fat and flesh.

Not only was there this heavy waste of what was eaten, but a great waste of what was not eaten in the food trampled under foot in muddy weather, and in snowy, windy weather much of the finer portions of the hay was blown away by the wind.

Another serious waste came from the loss of manure. The main products of the feed are, of course, fat, flesh, butter, cheese, &c., to produce which it is fed. But a very important by-product is the manure; indeed, sometimes the entire profit of winter feeding lies in this by-product. In a rough sense our foods for animals may be said to be composed of two kinds or classes of elements; the one mainly carbonaceous and fitted to sustain animal life and create animal growth and products; the other partly nitrogenous and partly mineral, and fitted to create vegetable growth and products. When the animal eats the hay and grain, it appropriates the first class of elements, and a small part of the second, but rejects in its voidings, solid and liquid, almost the whole of the second class, the food for vegetables.

Value of Voidings.

Dr. Emil Wolff's analyses show that about nine tenths of the plant-food found in the hay and grain *remains in their voidings*. I refer to nitrogen, phosphoric acid, and potash, the three elements that are first to fail in soils under cultivation, and which should, therefore, be most carefully conserved. In these days, when we plow under entire crops of clover, buckwheat, millet, peas, etc., solely for their manure value—their plant-food—it seems strange that the early settlers should have disregarded the manure value of the feed as they did. They suffered the dung and urine to fall and accumulate around the stock pens, in the low land along the streams, or on the frozen ponds where the cattle drank the freezing water, or along the fence corners, or in the "timber" or woods where the cattle sought shelter. These voidings falling in mud or snow or frozen ground, themselves froze, and then in soft weather and heavy rains and thaws dissolved and lost their most valuable and available parts into the brooks and ponds, and hence into the rivers and lakes. It is, perhaps, within the truth to say that three fourths of the entire value was washed away or left in places where it was of little use; while the churning and poaching of the meadows by the cows' hoofs, especially around the stock pens, injured them almost as much as they were benefited by what was left of the manure. And yet barns might easily have been built. Stone, lime, and sand for foundation and basement were abundant and accessible; lumber and timber in the tree were wasted by the million feet. Poplars and black walnuts, single trees of which today would bring a half hundred dollars, were slashed and logged and burned. Saw-mills on all the creeks would have converted them into lumber and timber and shingles, and good bank-barns, with basement stables, could have been built with little cost save for saw-mill bills, lime, nails, and carpenters' wages.

The incessant labors of pioneer life, and the shelter of the forests making the climate milder and less severe upon the cows than now, give some excuse for this neglect of the early settlers. And the fact that the soil at first was fertile, and that science had not then explained the nature of plant-food and animal food, and the means and wisdom of economizing both; and their neglect is not strange. But we, their sons, have inherited from them, with our soil-impoverished farms, knowledge their ignorance has forced upon us, viz: The knowledge of the loss of fertility from the soil under such a system of the value of animal voidings properly used, and of the immense saving of feed secured by sheltering stock in warm and comfortable quarters.

The March of Improvement.

Since the heavy pioneer work is now done, and we have the time and means for building, there is for us no excuse if we leave our stock exposed to the blasts of winter, or our fields denuded as they now are of their first protection. For us it is a double crime of wastefulness and of inhumanity. And yet in the southern half of Ohio a large portion of the stock still goes unsheltered in winter, and even in the northern half far too much of it is not properly sheltered for warmth, comfort, and economy of feed and manure. Another waste of feed was from the over-maturity of the hay cut. Haying was not begun until the hay was pretty ripe, so that it would make in the swath; and by the time forty to sixty acres were cut with the scythe, the hay was ripe and woody and of little value as a milk producer. This fact, taken in connection with the lack of shelter, made the milk-flow practically cease with the first cold rains of November, and not begin to be of much value till the grass and warmth of late May arrived, thus practically shortening the season of *profit* from the dairy and lengthening the period of expense by fully three months, as compared with that secured by the present all-day and all-night stabling, warm bank-barns, and early-cut hay—dried grass.

The first real advance in the *care of cows* began some twenty-five years ago with the general introduction of mowing machines, and the construction of what were known as "milking barns." The machines made it possible to cut the grass greener and make it better and finish haying sooner and have dried grass, not woody hay, to feed; and the barns made it possible to feed the hay to better advantage. The barns were very imperfect, but were a most decided advance upon the old system of stock-feeding and yard-milking. They were all quite similar in construction, the best size being thirty feet in width, with a feed-passage or drive-way twelve feet wide through the middle lengthwise under the ridge, and a row of stanchions the whole length on each side in which the cows were fastened with heads in this wide feed-passage. These barns varied in length for the required number of cows, twenty cows requiring a barn thirty-two feet long, and forty cows requiring one sixty-four feet long. Some of these barns were only twenty-four feet wide, with merely a narrow feed-passage, not a drive-way, through the middle lengthwise. Their name "milking barns" indidictated their original design and their chief value. The cows were stanchioned at milking time, even in summer. They saved the mud and rain, or the heat, flies, and cow-chasing of the old milking-yards in summer and the cold and snow in fall and spring. The cows were salted or fed a handful or two of shorts or meal in these barns to wont them to the stanchions, and it made the milking much more satisfactory and cleanly. (Mr. Chamberlain here explained a large prospective view of this kind of milking barn.)

The faults of these milking barns were, first, that they had very little storage for hay and straw over-head; second, that they had not (though they might have had) the means of saving the liquid manure, neither floors nor manure gutters water-tight, nor bedding and absorbent at hand. A half dozen tons of hay could be stored in the loft over twenty cows by pitching it all up from loads at the end of the barn and mowing it back towards the middle by hand. . The increased comfort of the cows, and the increased economy both of feed and manure, even in these imperfect barns, became so apparent that cows were kept in the stable at least by night in winter time, and hay was drawn in from stacks and little meadow barns more and more and fed in these barns. This soon suggested the need of greater storage for hay and straw, and gradually led the way to the modern bank dairy barn, with high drive-ways, deep bays, abundant and easy storage, with the hay pitched largely down and not up from the loads, with threshing floor and storage for wheat, straw, and basement stables for cattle. These barns will be more fully described under the *good features* of Ohio dairying, further on.

The Factory System—Bad Features.

The cheese factory system introduced some twenty years ago had some good and some bad features. It was based on a sound principle of political economy, that of the division of labor. Five men in a factory with water, steam, and proper appliances and conveniences could do the work of fifty men in private dairies, and produce on the average a better and more uniform grade, either of butter or of cheese, and get a better price.

The bad features of the factory system were these: the owners or operators of the factories gradually began to try to eat their cake and keep it, too. to "skim the milk on both sides," as the expression is, for butter and then make cheese of the skimmed milk and butter-milk. The Ohio white-oak cheese got a bad name and brought a low price in the markets, and the milk-buying factories gradually put down the prices paid the farmers for milk, on the basis of the actual sales of this skimmed cheese, and said little about the sales of butter made from the cream of which this white-oak cheese was robbed. Cheese and not butter had been the main product of the private dairies, and it was natural to base the price paid for the ten pounds of milk bought to make the pound of cheese upon the market price of cheese. It was a thing of gradual growth, and the skimming went deeper and deeper, until in some cases and seasons of the year the butter paid for the milk, and the cheese represented the profit, less the cost of manufacture. Farmers had gradually got out of the way of making cheese or butter at home, lost or destroyed their appliances, and thus finally came to be completely under the power of two great factory-owning and milk-buying firms, one in Hudson, and one in Wellington; for all the smaller milk-buying cheese factories found it more to their interest to be guided by the prices paid by these firms. For a time the farmers had nothing to do in the matter but take their milk to the factory and receive whatever price these great firms chose to give for any month or half month. If a farmer refused to deliver milk any month, thinking the price offered too low, he was shut out from returning for the entire year, even if the price paid the next month was satisfactory to him. This was smart-money, not business, and the fact that the farmers submitted simply went to show how completely they had suffered themselves to come into the power of these great firms, which were essentially monopolies, each covering separate territory and neither competing nor interfering with each other. They must have been something more than human not to have used this power to their own commercial advantage. The farmer had a quickly perishable product, milk, which must be twice a day converted into the less perishable form of butter or cheese, and he had neither the time, the skill, nor the appliances for converting it, at least in the busy season, and the monopolist buyer knew it. The worst feature of this era of the large manufacture of dairy products is the dilution or adulteration of the products by the manufacturers, and the virtual acquiescence of the law. If the farmer skims or waters his milk and delivers it as "whole milk" at the factory, our law prescribes heavy penalties, and the manufacturers are swift to visit them upon the offender. The oleomargarine, suine, and butterine manufacturer, however, adulterates butter by mixing twice or four times its weight of beef fat, or hog lard, coloring it with annatto and churning it in milk or butter-milk to give it flavor. This makes a very good imitation of butter, in color and flavor, but not in cost or wholesomeness, and most of this counterfeit is sold, to the consumers, at least, as pure butter. Both the farmer and cheese-factory man object to this, but the latter skims the cream from his milk for cheese, and supplies its place with coloring matter; this cheese is sold, to the consumer, at least, with nothing to indicate that it is not full cream cheese. There is no secret, indeed, about the skimming; the jobber, and probably the retailers, know what they are handling, but not the consumer, usually. I believe our laws in all the States should require all adulterated or imitation butter, or skimmed, or diluted or adulterated cheese to be plainly branded just what it is, and by whom made, and so branded that the brand shall necessarily be in plain sight of the final purchaser, or consumer, when he buys it.

There is no need of a law for branding the pure. full cream article of butter or cheese. The maker will find that to his interest. But the law should prescribe heavy penalties for false or insufficient branding, and provide for inspection. with powers and funds for chemical analysis, and for prosecution, as is the case now in regard to commercial fertilizers. If chemistry and law are made to help the manufacturer of counterfeits, they should be made to protect the consumer and the producer of honest milk, butter, and cheese. I do not speak of other food adulterations, because, though numerous and injurious, they do not come under the scope of our subject.

Another bad feature of the factory system in Ohio was an incidental but not necessary one. I refer to the fact that when the farmers were set free from the former necessary and considerable labor of making up the butter and the cheese on their own farms, the most of them did not at once substitute other profitable farm-work. If they had combined and sent their milk to the factories and had the whey returned by great collecting wagons that with a single team could do this work for a dozen dairies, and had then put themselves and their teams at steady, well-planned work upon their farms, in the tilling of crops, especially the cereals, then the factory, if wisely and honestly managed, might have proved a real blessing. But instead of combining thus, as a rule each farmer delivered his own milk morning and night with team and fancy spring milk-wagon, and work stood still while he had gone two or three miles to the factory. This broke up the day, so far as steady team work on the farm was concerned. This trouble began during the war when help was scarce. So that it came to be the case on many dairy farms that about the only work of any account accomplished was to milk the cows, deliver the milk, and cut the hay in summer and feed it out in winter. It was a dull and insufficient routine, with neither pay nor inspiration.

Many of the factories were located in or near the villages, and many farmers spent a large part of their time between milkings in "bottoming chairs" at the village grocery or whittling pine boxes in front of the dry goods store, waiting for factory pay-day to come around and grumbling feebly at the low prices of milk. The fallacy was common that their cows were working while their owners sat still, and that they, the farmers, could earn as much in idleness as when they used their time and skill nearly all day making up their butter or cheese at their home dairies. Little plowing was done. Not enough wheat was raised in these dairy regions to furnish bread for a quarter of the dairymen, or enough corn and oats for a quarter of the necessary grain for the horses and cows, not enough calves from the thin, twice-skimmed factory whey to supply a quarter of the places of the cows that aged or died; so the annual cash drain for flour, feed, and cows was immense and sometimes ruinous. Dairymen sold out and went West or to the towns. Geauga county, which has no large towns, lost two thousand in population in the decade from 1870 to 1880. It was a shiftless, wasteful, lazy life. The cows lay on the leaky floors of the milking barns, with the wind and snow whistling up through the cracks of the floor, with no straw for bedding, comfort, and absorbents; shiftless and miserable. The liquid voidings, worth quite as much as the solid, were a sheer waste, and the solid thrown out beneath the dripping eaves till autumn oftentimes were robbed of their soluble and richest part, and the drenched or steeped remains, the tea and coffee grounds, so to say, were saved and carted to the fields.

Tendency to Drought—The Sabbath.

Still another bad feature or effect of this extensive or exclusive dairying with no tillage of crops, leaf exposure, setting of orchards, and with the rapid diminution of forest area, was to increase the frequency, severity, and duration of local droughts, according to the well-known meteorological law, which I must not and need not stop here to explain, but which has its familiar illustration in the deposit of moisture on the outside of the pitcher of cold water in summer, but never on the pitcher of warm water. There can be no question of the fact of the frequency of droughts on large areas neither in forests or swamps or under tillage.

Another bad feature of this exclusive dairying was the partial obliteration of the Sabbath. The milking and feeding must of course be done, and most dairymen thought it right and necessary to make the milk into cheese in the early times and to take it to the factories when they came into vogue. This made the work on the Sabbath nearly the same in kind and amount as on other days. It was hard, even for those who desired it, to be regular and prompt in their attendance at church. It is not specially in point here to say whether I am a believer in Christianity, but it is in point to say that, as a reader of past and current history, and as a traveler and observer in our own country, I am compelled to see that those nations and communities that keep the Sabbath as a day of rest and religious observance most nearly in the spirit of Him who said "The Sabbath was made for man," that these are the ones that stand highest physically, mentally, financially, socially, and morally.

Now, the introduction of the factory system made the proper observance of the Sabbath far easier for the farmer. If the milk was to be saved at all, the factory seemed the easiest and best place and means of saving it. Some conscientiously kept the milk at home, setting it Sunday and skimming and making butter Monday. But this greatly increased the work at home, and did not appreciably diminish it at the factory, since all the motions must be gone through at any rate; for a very large proportion of the farmers, with apparently equal conscience, insisted that if they sent their milk to the factory during the week to save labor, they should much more do so on the Sabbath. Still, the business aspect of the running of milk and whey wagons made the day seem much like other days, and in point of fact Sabbath observance and church attendance were probably neither increased or diminished by the factory system.

Coarseness.

The last bad feature of dairying I shall mention is its tendency to coarseness and impurity. In the great milking yards, cows and other cattle run loose together, and hired girls and hired men and boys milked the cows in mud and filth much of the time, the entire surroundings combined to make thought, word, and deed indelicate, immodest, coarse, and even revolting and immoral. This evil effect largely passed away with the advent of the milking barns, and with the growing custom on the reverse of having the men do all the milking.

Good Features.

You will be glad with me to leave the consideration of the bad features of dairying, and consider some of the good, desirable, and hopeful ones that are beginning to appear in the newest stage or era of the historic development of dairying in Ohio. This stage is not yet fully come, but its coming seems assured in the increasing practice of the most progressive men and communities. Let me grasp and characterize and describe it in a single sentence as the era of bank dairy-barns, water-tight stable floors, complete manure saving, tile drainage, increased crop tillage, especially of wheat, separate creameries and cream-cheese factories, of calf-raising and consequent improvement of the stock, and winter dairying. I believe the cream-gathering creamery will be better than the cheese factory, because it will leave the skimmed milk on the farm and render it possible to raise good calves from the best milkers of our herds, and from sires of the best milk breeds or families. Successful calf-raising on thin, twice-skimmed factory whey is next to impossible. Nor can dairying be made profitable without the constant improvement of the milking qualities of our dairies. At the recent annual meeting of the Iowa State Board of Agriculture, one of the resolutions passed strongly advises farmers to keep their young stock to maturity, one of the speakers, J. B. Grinnell, asserting that it was as good as money at twenty per cent. And yet, Herod-like, our Ohio dairymen have slaughtered the innocents almost at their birth.

Bank Dairy Barns.

Says a writer in the *Country Gentleman:* "A good basement is almost as necessary for making a complete farm barn as a kitchen for a farm-house." Especially on a dairy farm is a bank or basement barn, with basement level with the surface, essential.

I have not the least doubt that grain-raising combined with dairying will work to the best advantage financially, and in the long run in the enrichment of the land. The cows need the corn and the mill feed from the wheat, and the stalks and straw for feed, and the refuse of both the last for bedding and absorbent. Theoretically, a dairy farm should deteriorate less, or rather should gain in fertility more rapidly than a grain farm. A hundred dollars, worth of cheese, and especially of butter, sold from the farm, if whey and skimmed milk are wisely fed, takes from the farm scarcely one tenth as much plant-food from the soil as one hundred dollars worth of grain and straw. But practically the dairy farms in an early day deteriorated the most rapidly. But, this combined grain and dairy farming requires good bank barns. The trouble was that for many years most of the dairy farmers did not see the importance and had not the means of storing the feed and bedding, feeding the stock and saving the manure all under one roof. Many of the farmers had one or two of the old 30 × 40 barns of four bents and three divisions. These had the barn floor in the middle, cross-wise, stable and scaffold on one side, bay and granary in the other. They would store ten tons of hay, stable six cows and two or three horses. Some farmers had moved two of these together, as in the first figure, and made unhandy storage for twenty-five tons of hay, a little straw and stabling for forty-five cows and four horses. The desire to use these old barns and yet make a bank barn with stabling for cows and horses, feed and bedding sufficient, and storage for wagons, for wheat in the sheaf, all under one roof, warm, comfortable, and convenient, led to the plan shown in perspective No. 2, and ground plan No. 3, which has so many advantages as perhaps to warrant building thus from new material. If there are two 30 × 40 ft. barns, they are moved together, end to end, on a suitable location, with slight slope, if possible, toward the south or south-west in the rear. The barns are jacked up nine feet, the basement built under, driveway and bank cistern in front, full height and length lean-to in the rear, fifteen feet wide, for cow stables and feed passage, and low lean-to at one end for horses and wagons, and a like one if needed at the other end for cows or young stock, or a part for farm implements. Four of the six spaces of the main building are used as barn floors, one permanent the others temporary, to be taken up, timbers and all and make deep basement bays. The two outside spaces are permanent basement bays, which are filled from basement to roof from the adjacent temporary floors. These floors are then taken up and their spaces filled. The third floor from the left is a permanent threshing floor, with granaries and meal bins beneath. The basement of the bays next the threshing floor can be well filled with hay, so they will settle to a level with the floor when pressed with grain in the sheaf.

With a lean-to at each end, this barn will store eighty tons of hay, fifteen tons of straw, and stable thirty-six cows, twelve young cattle, four horses and two wagons, besides tools and implements on the barn floor 13½ × 45 feet [Mr. C. here explained the barn fully from a large perspective drawing.]

Points of Excellence.

The points of excellence in favor of this barn are:

1. Economy of space, having no waste room, and heavy pressure on the hay in the bays, hence close packing.
2. No useless expense in building.
3. Great economy of timber, from the fact that the weight of the hay

and sheaf grain all rests on the grouted (under-drained) basement, and hence all the timbers of the barn may be six by six, three by six, two by six, and two by eight, or two by ten.

4. Economy of feed, by keeping stock and drinking water always comfortably warm.

5. Economy of manure, by saving all liquids and mixing with straw, chaff, or horse manure.

6. Economy of labor in storing and feeding hay and grain, by always taking advantage of the force of gravitation.

7. Economy of labor also by keeping everything under one roof,—stock, feed, absorbents, water, implements, all conveniently accessible to each other. [These points Mr. Chamberlain explained by reference to the large perspective and ground plan.]

With such a barn, and with a portion of a clayey dairy farm under-drained, fine crops of wheat, corn, &c., can be raised. Indeed, there is no better wheat land in Ohio. The cows, as remarked before, need the straw and stalks (for feed and bedding) that grow in a rotation with wheat, and, with meal and shorts and early-cut clover and timothy and Hungarian hay and water—not ice-cold, nor themselves shivering in storm and wind, but in a barn that never freezes their manure—will give a fine flow of milk nearly all winter, even when they are to calve in March, and produce an immense quantity of the richest manure. Then the growing corn, Hungarian grass, wheat, clover, and timothy in this order of rotation, give the very best means of utilizing the manure on a clayey dairy farm. There can be no doubt that where cows were fed as formerly, around the stack, and their droppings were washed and tramped all winter long, a large portion of the value of the manure was wasted. Nor do I believe that the top-dressing of permanent meadows, even in autumn, is the best use that can be made of manure in the clayey dairy regions. The plan I consider wisest on such a farm is this: With such a barn and stables as I have described, let the cows out into the warm barn-yard around the straw-stack, for water, about noon. Drive the team with sled or wagon through the cow-stable and load into the box the strawy manure from the water-tight gutter, with all the urine mixed with the straw and horse manure, draw it directly upon a timothy and clover turf intended for corn or Hungarian grass the next summer. Place it in compact piles of about five hundred pounds, in rows about a rod apart each way, more or less, according to the number of tons per acre you wish to use. (Five hundred pounds, or one fourth of a ton per pile, a rod apart, equals one-fourth of one hundred and sixty, or forty tons per acre.) In April, spread and thoroughly harrow this manure, and plow it under at once, rather shallow. There is thus the minimum of loss from waste and evaporation, and the mechanical effect of plowing the unrotted manure under is excellent on soft clay soil. Then grow corn one year and Hungarian grass the next, or Hungarian grass one or two years without corn, or Hungarian followed by potatoes, or follow the Hungarian with wheat, seeded to clover, plowing the ground for the wheat as soon as the Hungarian is cut, which will be before August 1, if it is sown early and cut as it should be, as soon as it fairly shows its heads and before the seed forms at all. The ground is in excellent condition, and if worked, fined, and compacted often till September 10, and then sown to wheat, there is excellent chance for a fine crop. Indeed, I know of no better preparation than this for wheat. If the ground is very rich, the timothy should not be sown till spring, with the clover, lest it should become so rank as to choke and injure the wheat. This I believe to be the best system on our clayey dairy farms, and our best farmers are rapidly working towards it.

The Cream Gathering System.

I believe that the cream-gathering creamery system is better than the cheese-factory system, in these respects:

1. It renders possible the improvement of our dairies, by raising calves from our best cows, and full-blood sires of acknowledged cheese, milk, or butter strains. This creamery system is familiar to you, no doubt, and I need not stop to explain it.
2. It takes the work out of the house almost as fully as the factory system, and the cost of transporting cream is far less than of transporting whole milk.
3. A better and more uniform quality of butter can be made than in the private creamery, and hence will sell for a better price.
4. The farmer with a private creamery *can* churn and sell his butter, if prices at the creamery are not satisfactory.

Winter Dairying.

The tendency, too, is towards *winter dairying*. Its advantages are that the product is worth more than in the heat of summer, and there is more time on the farm to handle it. I believe it would pay to have the cows come in in September and October and run dry, and recuperate in July and August, when flies and heat are worst, pastures short, and milk least profitable. Early-cut clover and Hungarian, with a little bran or other mill feed, will give a fine flow of milk in winter.

I believe dairymen should discourage and oppose all skimming for cheese and all bogus manufacturing of butter.

Dairying in the more southerly grain-raising districts of Ohio is a minor industry. The quality of the butter is usually poor; and little cheese is made. But recently the number of cows has been largely increased, private creameries are used for raising the cream, and a fine grade of butter is made at the cream-gathering factories, or at home, and is sold for so much better prices than was formerly received, as to give the creameries a decided boom nearly all over Ohio.

Conclusion.

I have discussed the subject from the dairyman's stand-point, not the manufacturer's.

In conclusion, let me recapitulate, and leave freshly in your mind that the bad features of dairying in Ohio, or in any other place, are wastefulness, or loss of feed, manure, stock, calves, quality of cows, and quality and quantity of product, and hence of net returns, loss of time, and of moral force by the dairymen.

The good features of dairying will be the converse of these, and are coming in gradually in the form of better barns, better saving of manure, tile dainage, better tillage, more grain and straw raising, creameries for butter, and factories for cream cheese alone, the improvement of our dairies by intelligent breeding up and feeding, the exposure or prevention by law of all adulterated, diluted, or imitation dairy products, except under distinct brand of maker, and character of the article.

Let me leave with you this thought, that no system can bring permanent prosperity to the farmers that does not secure, as rapidly as may be these five points or lines of excellence:

1. The increased fertility and productiveness of our farms.
2. The increased capacity of our dairies for the production of milk, butter, and cheese, increase of quality.
3. Improved quality of the product.
4. Increased price, due to quality, and paid to the dairyman himself.
5. An improvement in the social, intellectual, and moral force and character of the dairymen themselves.

I would leave with you, as my sincere and parting wish, that each dairyman in Pennsylvania could post upon the head of his bedstead these five points, or lines, of excellence, and night by night, as he lies down to sleep, and morning by morning as he rises up for labor, should sincerely say: "My intelligent, persistent, life-long efforts shall be, to rise as rapidly as possible on these five parallel lines of excellence."

DISCUSSION—HUNGARIAN GRASS.

Mr. **BENJAMIN CULP.** How do you compare Hungarian grass with timothy or clover?

Prof. **CHAMBERLAIN.** A chemical analysis shows it is almost equivalent to timothy hay. I have considered it a little better than timothy hay for the production of milk. I have fed a great deal in my own dairy. Sow thick and cut as soon as the heads show.

A **MEMBER.** What time do you sow?

Prof. **CHAMBERLAIN.** Sow early in April. First keep the Thomas harrow on until it is fine enough for an onion bed. Sow it in April and harrow it in, and you will see it come up in three or four days. It is wide awake, and will grow very fast. It is a rank feeder.

Mr. **CULP.** Is it not liable to damage by frost?

Prof. **CHAMBERLAIN.** Plow in April, and keep it tilled until the hot weather comes, hot enough to finish planting corn. My Hungarian grass goes in immediately after corn-planting.

Mr. **A. R. STURTEVANT.** Is your water-tank as described—supplied from rain-water?

Prof. **CHAMBERLAIN.** Yes, sir. The barn is spouted all around, and a spout leading into the cistern.

Mr. **STURTEVANT.** Have you room in your stable to feed out all the hay you can store?

Prof. **CHAMBERLAIN.** I have storage for eighty tons of hay and thirty tons of straw. Thirty-six cows will average over forty tons of hay; with your horses, that just holds about enough to be sure. You want a place for your grain.

Bogus Dairy Products.

Hon. **M. C. BEEBE.** Prof. Chamberlain, in his discussion of oleomargarine and suine, spoke of them as deceptions and frauds, and injurious to the public health, and then intimated that the courts of Ohio would not sustain legislation against such deceptions and frauds detrimental to the public health. I would inquire why would the courts of Ohio sustain an act prohibiting the manufacture of articles to put upon the market which are deceptions, frauds, and injurious to public health?

Prof. **CHAMBERLAIN.** My feeling is that our laws would probably require them to sell for what they are. I am not so sure they are to such an extent injurious to health that we can prove it in court. I wish we could, but I am not sure we can do it. The manufacture of adulterated products is simply enormous. They begin and end I do not know where—

spices, sugars, teas, coffees—and the worst of it is, the people want them. They want something cheap and that is what curses us with something cheap. As long as they want them, and the manufacturer will make them, we cannot beat them. I should be content to require them to sail under their own colors.

Mr. BEEBE. Suppose the people want immoral literature, would it be tolerated? Is the gentleman aware that the State of Missouri has an act against bogus butter sustained by the courts?

Prof. CHAMBERLAIN. Yes, sir; and New York.

Mr. BEEBE. Is he also aware that a judge of the United States court has decided that it is not inconsistent with the Constitution?

Prof. CHAMBERLAIN. I had not heard of that.

The CHAIR suggested that the evening session was to be devoted to the several topics upon which legislation is expected, and the propriety of not opening the question in the afternoon.

Hungarian Grass Again.

Mr. SPITLER. I would like to know the quantity of Hungarian grass-seed to the acre, and also the curing quality of the grass.

Prof. CHAMBERLAIN. It is hard to cure. That is the main difficulty. The quantity of seed should be about a bushel to the acre of good Hungarian grass. I prefer the black head. It is harder to cure than the other, especially in wet weather. Consult the weather reports, and your barometer, and your weather eye, and be sure you have two or three days of good weather ahead. After you mow and put it in cocks, open up the cocks a little before hauling. It is not much harder to cure than a first crop of clover hay. I do not think it is any harder than a first crop of clover or timothy hay. When clover has just come to bloom, that is the time to cut it.

A MEMBER. What advantage is there in raising Hungarian over timothy?

Prof. CHAMBERLAIN. The advantage is you can follow it in rotation. You can follow it with wheat. It is a good rotation crop. With our soil you can turn the soil; but if you try to plow timothy you cannot possibly turn it. The Hungarian is very mellowing. The advantage is it is a catch crop.

A MEMBER. Do you raise much oats?

Prof. CHAMBERLAIN. No, sir. I can make more money on Hungarian than on oats.

Mr. HAZARD. You can raise a crop of corn-fodder and then raise the Hungarian. You can raise that in six weeks. The only difficulty is that from the time of ripening you are apt to have heavy storms, and when affected by the wet it is not advisable to feed it to horses.

Prof. CHAMBERLAIN. I should not advise feeding it to horses, at any rate.

Mr. HAZARD. That is the proper opinion.

Cost of Barn.

Mr. STURTEVANT. I would ask the gentleman the cost of building the barn complete—cistern and all.

Prof. CHAMBERLAIN. The cost would be for that size, frame, a little over fifteen hundred dollars. You can make the rafters so much lighter in this frame than in others. The wider you make the span of the rafters, the more expensive. The expense of roofing increases rapidly as the width increases, not as the length increases.

A MEMBER. What size did I understand you to say your barn is?

Prof. CHAMBERLAIN. My barn happens to be made of two 30×40 barns. It is 30×80; with the lean-to, it is 45×80, besides the little lean-to at the end.

Mr. HAZARD. It is very much the same plan we use in Chester county. We have basement stables. The more advanced idea is to do away with the basement stables, and to build long stables for the cattle separate from the barn, and then building a little railroad from barn to barn to wheel the hay and feed in cars to the animals. There is thought to be no contamination of the food from the odor of the animals. It is also thought that the bank barns are too damp and dark. The advanced mode is to carry these bins down to the ground. It is also an advantage if fire takes place. The building of a little railway to run between the two lines of cattle is not expensive and they can be fed very rapidly. There can be two lines—one for hay and the other for feed.

Prof. CHAMBERLAIN. There is no smell from manure in mine.

A MEMBER. How deep is your manure gutter?

Prof. CHAMBERLAIN. About six inches deep and two feet wide. The cows never step into it. I have windows in the end and rear, and the ventilation is very good. I have used my barn ten years, and I have never had any trouble with the hay. It must be protected from the stone wall. It should be guarded off with a little board space back of it.

Roofing Material.

Mr. STURTEVANT. What material is best for roofing?

Prof. CHAMBERLAIN. Slate is best, and it does not cost much more. My own barn has pine shingles, however.

Mr. SIBLEY. I would say on the subject of roofing, we have tried, with some considerable satisfaction, the paper roof. I know something about slate roofing. My knowledge is it is not the most satisfactory, unless put on very skillfully. I have known one to have to be replaced three times in eight years. I prefer shingle roof to slate, but we have paper roof on our stable. It has another advantage which is an advantage to every farmer, that of cheapness. As to durability, the oldest one was put on five years ago, and it is as good to-day as the day it was put on. In case of repairs being needed, a man with a pot of pitch, some nails and paper can do it himself. We have a good roof and lessen the load on the barn considerably.

Mr. GREENE. Can the gentleman give us an idea of the relative cost?

Mr. SIBLEY. About one third. Our estimates were, my impression is, eighteen hundred dollars, and this cost six hundred dollars. I know it is less than one third, and I know it is being used very extensively in the West.

Mr. EVERSON. In relation to roofing, there is a felt roofing used largely for flat roofs. It costs two dollars and seventy-five cents per square, three-ply material. It makes a durable roof. This two dollars and seventy-five cents includes a sufficient quantity of paint and material to put it on—for putting on two coats of paint, also the nails necessary for putting it on. I have barns on which the old roofing is giving out, and I take this and run it up and down as far as I need, and where the old and new join I lap over the old and nail it down with eight-penny nails, and then go over the whole with a coat of this paint, or preparation. I think it will save my barn roofs fifteen or twenty years longer. The only danger is the liability of stepping over where the shingles terminate, and perchance break a hole in it. That is the only objection. It is fire-proof, if mixed with clean, dry sand.

Timothy Grass.—Timothy Hay.

A **MEMBER.** I would ask Prof. Chamberlain at what stage of ripeness he would cut timothy, if it was alone?

Prof. **CHAMBERLAIN.** If I wanted to sell timothy for horse feed, I would cut it just as it had gone out of bloom. That is the most acceptable; I would cut it a little earlier, escaping the dust stage; and for cattle, I would cut it earlier yet. When clover grows with timothy, which is the best feed for cattle, I cut it just as soon as the clover has bloomed.

Mr. **SIBLEY.** I would like to ask the gentleman, if it would not pay to sell all the hay at any time, for the benefit of the farm? I understand he substitutes his bran for his hay. I believe the manure value of the hay is less than one third the manure value of the bran. We must have fodder for the stock. I think there is a point dairymen miss to set off the value of the feeds. We feed a considerable amount of linseed meal. Of course, the majority know a pint of that linseed meal put back on the soil is worth a little more than the first cost of the linseed meal. We had better feed that than buy super-phosphate. If you are considering the use of super-phosphates to enrich your land, you had better take the money and put it into bran, for it is worth more eaten than the phosphates would be.

Prof. **CHAMBERLAIN.** I agree to that. The comparative value, beginning at the bottom feed, is Hungarian hay, timothy, clover, wheat-bran, or shorts, linseed meal, and, perhaps, even higher than that, cotton-seed meal, which we do not use in this part of the country.

Silo in the Barn.

Mr. **STURTEVANT.** I have a spring furnishing water for my barn, consequently I would not need a cistern. I want to know if a silo could not be put in that bridge embankment?

Prof. **CHAMBERLAIN.** My opinion would not be any better than that of any one else. There might be. A silo could be very easily put in one of the bins. I do not know anything about silos from practical experience, hence I have no opinion.

Mr. **HAZARD.** We use that place for a silo. The majority of farmers use it for a wagon-house.

Farmers' Institutes.

Prof. **CHAMBERLAIN.** I have with me quite a number of circulars which give appointments for farmers' institutes in Ohio. We hold about forty of these institutes during the three winter months. Five years ago, when I came into the Board of Agriculture as Secretary, I submitted a plan of winter institutes. They asked how much money would be needed. I said to them, if they chose, to put one thousand dollars in the bank, and I would draw what was necessary therefrom. The first year I used about six hundred dollars. We did not have an appropriation. The next year the Legislature increased the fund to six thousand dollars, and we nearly trebled our expenses.

The first circular to local committees says that institutes will be held, as far as possible, in any county where the local organization or individuals will provide a good and commodious hall, pay the necessary expenses of advertising, thoroughly advertise, furnish music, and furnish local speakers to join in discussion. Under that we had more calls than we could attend to. The first year they were slimly attended. The second year the Agricultural College put in one hundred and fifty dollars, the Board of Agriculture put in one thousand dollars. This year the Horticultural Society puts in one hundred dollars to pay expenses, and the State Grange puts in about one hundred dollars. We are all working together cordially and harmoniously.

The institutes are held usually in the largest halls in the town. This year those halls have been filled to overflowing. At first, usually, we found only gentlemen. I had a way of laughing at them, and saying I did not know that farmers were either all old bachelors or ashamed of their wives, and the next day they would come and bring their wives. In one county the hall seats twelve hundred. The first day it was full; the second day it was filled to overflowing. The last institute held was last Saturday, at Cuyahoga Falls. The people flocked there. The hall seats about eight hundred. They were obliged to bring in chairs and fill up the aisles. The institutes are all well attended. Two or three lectures are given on various subjects especially interesting to the people of the locality where the institute is held. I have a list of lecturers and the subjects upon which they speak, and send it to the local officers. They choose their speakers, and make up a circular selecting the subjects and speakers who will be the most acceptable to their people. Agricultural and social topics are mingled. Especially for the evening lecture we choose a subject of a general, social, or amusing nature.

We have considered it a good work, which has paid at the State Fair, bringing the agricultural board in close relationship with the people. We have a crop-reporting system, which is advantageous. The crop correspondents are all presented with complimentary tickets to the State Fair. Each of the dead-heads brings three or four live-heads. Before the system was inaugurated, we never got anybody from the northern counties. The Pennsylvania system of railways last year brought about one thousand. Mr. Clark, the general ticket agent of the New York, Pennsylvania and Ohio says the transportation over their lines was immense last year.

This system of correspondence brings the Board of Agriculture into close communication with the farmers. Almost all the farmers know myself and the members of the Board. The one thousand dollars is paid out of the Board of Agriculture. If we paid it out of the State Fair funds, I believe it would come back. It is not only an educational, but a financial success.

Our Board does a broader work. We do the work of the farmers' institutes, the inspection of fertilizers, the crop report, and the State Fair work. In some States there are several boards to perform that work. The only separate board we have is the Horticultural Society. They receive one thousand dollars for lectures upon horticultural subjects. We are trying to move along the several lines of agriculture—the breeding, the dairy, the cereal, and the horticultural interests. They blend together in different localities, and are brought together at the institutes, as the circumstances may require. Every year we have increased attendance, and wherever we have held them four times they are sure to succeed.

Discussion.

Mr. **Beebe**. For the benefit of the farmers here, I wish to state this with reference to the matter of institutes. It is a matter that the State Board has had in view for years, but the trouble has been to get an appropriation to aid it. Before we came away from Harrisburg, we succeeded in getting into our bill an additional one thousand dollars, to assist in holding farmers' institutes throughout the State. We are in hopes now of getting a starting-point.

Mr. HAZARD. We are doing something of that work in Pennsylvania. At Lancaster, a short time ago, there was a very large attendance. There was, also, one held in Washington county, of which Mr. McDowell was the leading spirit. Since the Dairymen's Association has resolved to go out from the northern counties of the State, it has taken the place of institutes. At West Chester we took in sixty-three members. They paid one dollar each, and got the State report. At Doylestown we took in thirty-six members. The expenses were paid by new members. The more meetings we have the more influence we gain.

Mr. CULP. I will confine my talk to the farmers of Crawford county. We ought to have had this room filled to overflowing; and it would be, if farmers would have a little instruction or take the second thought in regard to dairying or agriculture. Begin with a farmers' club. We ought to have farmers' clubs, to meet every one or two weeks, and talk over the various subjects, and give and take all the useful information we can. We hear of the road laws. Will we have better roads by having a different system of road tax, or road laws? I think the road laws are sufficient. If we use the means we have at hand. we could have just as good roads as if the laws were changed. This should be discussed amongst farmers at the club meetings. In the next place, the school laws. We hear of those who wish to have the higher branches taught, which, I think, would take the time of the teachers. The various topics of farming and dairying could be discussed. Farmers complain of legislation, yet they do not make known their wants. By coöperation, we would find out our wants and let them be made known.

Prof. S. R. THOMPSON. It may be worth while to say that it is possible to carry on a system of farmers' institutes without a State appropriation. In the State where I resided since 1873, they have had from five to fifteen institutes in the different counties, and never had a dollar of State appropriation money either from the State Board or Legislature. All the expenses were paid by the persons who attended the meetings. I had the pleasure of attending a good many of those meetings—organized the first one and attended a good many. We found them to pay. You can have them. They will be well attended and be most profitable.

The CHAIR. I think we must all feel gratified with our work. Although we are a comparatively small body, we should remember we are addressing a very large number of people through the medium of the agricultural report, of which there are twenty-five thousand copies issued every year. I have a letter in my possession saying, "If you expect to exercise influence at Harrisburg, let your wants be known and they certainly will be heeded." The meeting to-night will be devoted to the discussion of legislative action.

Meeting adjourned until 7.30, P. M.

EVENING SESSION.

At 7.30, P. M., the evening session was called to order, President A. M. Fuller in the chair.

The CHAIR. I deem it proper to present a letter which I received from one of our representatives in the Legislature to-day. I do not know that he wrote it with the intention of my presenting it.

The President here read an interesting letter from Hon. John Fuller, (member of the Legislature,) ex-President of the Association, in which he spoke words of encouragement to the Association, regretted his inability to be present at the meeting, and expressed the belief that the day was near at hand when some much-needed legislation in the interest of the dairy business would be had. The letter not having come into the hands of the Secretary, he is unable to give it entire.

Legislative Matters.

The CHAIR. We shall discuss those questions to-night which are before the Legislature. I believe there is not one of them that has not been presented to the Legislature in one form or another, and upon some of them there have been laws, or proposed laws, under various titles, passed. I think it is eminently proper and right that this organization should express its opinion upon these questions, and, if it is deemed advisable, send an expression of opinion to the Committee on Agriculture of the Senate and House. We will discuss these three questions, based upon notes taken by Willis P. Hazard at the State Board meeting: "Oleomargarine, and the Laws that have been placed in the hands of the Legislature bearing upon that Subject." The next question will be "An Agricultural Experiment Station." That was not discussed before the State Board. They have taken action, and it remains for us to take some action. The third will be the road matter, which was discussed in the State Board last week, and the report of the committee adopted. I had the honor of representing this society, and, although I have not taken notes upon these topics, I desire to enter into the discussion of them. I will take the liberty of calling Mr. Magaw to the chair.

Mr. LEON C. MAGAW complied with the request of the Chair, and presided during the evening, first calling upon Mr. Hazard to present his notes.

Bogus Dairy Products—Notes on the State Board Meeting.

Mr. HAZARD. Mr. Chairman and Gentlemen: The question of oleomargarine has been considered one that is very pertinent and germain to the business of this Association. At the last two meetings, at West Chester and Doylestown, the subject came up and was pretty well discussed by the dairymen of those two sections. At the last meeting, at Doylestown, it was proposed that we should pass a resolution, and the matter was discussed, *pro* and *con*, some parties taking the view that a prohibitory law would be entirely unconstitutional. It was just at that time in process of litigation in the New York courts, in the case of a Mr. McGahn, who brought up the matter there against himself. I suppose you are all familiar with the decision of the Court. The majority of the Court ruled that it was wrong for Mr. McGahn to make this oleomargarine and put it on the market, and that the law passed by the New York Legislature was constitutional; that it is prejudicial to public health—one of the judges—Judge Pratt—dissenting from the opinion of the Court. Mr. McGahn has, consequently, broken up his factory in New York and removed it to Pennsylvania, and has established it in Philadelphia. Pennsylvania, you will see, is to have the honor of having the largest oleomargarine factory in the country, to turn this stuff out to compete with her farmers.

This Association appointed a committee to watch what was going on.

The chairman of that committee was Mr. Eastburn Reeder. I was also a member of the committee. We agreed to a report, which was read before the State Board of Agriculture last week, and excited a great deal of attention, and upon it a discussion took place and a resolution passed.

Such a bill cannot be passed. You cannot protect a special class. It was thought the bill should be entitled, "Prevention of the manufacture of adulterated articles on the grounds of public health." That bill was copied by Edward Brinton, of West Chester.

I will read, "An act to regulate the sale of imitation butter and cheese, etc."

[Bill read.]

That was intended to be a license law. These matters being brought before the State Board of Agriculture, there arose a discussion, participated in by a number of the gentlemen there. Some spoke quite to the point, and some not so directly.

The original prohibitory law provided for the appointment of a commissioner, but he could not act until amendments were made to the Constitution, authorizing the appointment of such an officer. It called for bringing in the aid of the district attorney, and of the police or constables to hunt up the cases.

Another like bill, the same as the milk bill, asked to have inspectors appointed. Mr. Brinton, in alluding to the subject, said that tricks were resorted to, to forward the sale of oleomargarine until at the present time it passed as if it was a moral right to sell it; also, as if it was under the shadow of the law. He discussed three points: *First*, How shall we sell it? '*Second*, How shall the consumer be notified? *Third*, How shall farmers be protected? He discussed the law of May, 1883, which was a prohibitory law against the manufacture and sale, but appointed nobody to carry out that law. Almost under the sanction, I will say, of that law, the sale has been going on ever since. The law is of no effect, unless somebody is appointed whose duty it is to hunt this matter up. What is everybody's business is nobody's business.

Of the oleomargarine sold ninety-nine per cent. has been sold as real butter. Formerly the price of winter butter was very good and profitable; now, in mid-winter, butter is dull, and for the past three years, milk has fallen one half per cent. He advised a prohibitory law against the manufacture of all such goods. The law which carried out this point had the serious defect that there was no section that provided for its proper enforcement. It was not really adopted by the State Board of Agriculture, but was suggested with amendments.

The Missouri law was presented also. Persons were convicted under that law and the convictions sustained by the courts, and the United States Court held that the Missouri law was constitutional on the ground that it was injurious to public health and they had a right to stop its manufacture. So it was in New York, and Mr. McGahn, as I said before, is moving to Philadelphia. If it could be proven, the lard of which part of it is composed undoubtedly has *trichinosis* in it. Therefore, it would be injurious to the public health. It is forty per cent. of butter and sixty per cent. lard, when properly manufactured; but the price they sell it for shows that they use gut-fat and other cheap stuff. If they did not, they could not sell it at such a low price. Therefore, Mr. Brinton said it was unhealthy. It can only be sold for what it is not, therefore it was sold under false pretenses. Farmers need protection against that.

Mr. Falkenburg says he believes the only way is to pass a prohibitory law. No butter-dealer was on the ground to watch and defend a prohibitory law. He was sent there to represent the market men of two of the largest houses, where more fine cheese and Delaware county butter were sold than in any house in the city of Philadelphia. He said the only way was to prohibit, because so much bogus butter is made that marking it would not be protection. He said he had been informed by the men working in several factories that the kind of material used was so disgusting that it ought to be stopped, if only on that account. He said the gatherers put in horse-fat from dead horses, and even collected fat from the gutters of the streets. He believed they could easily be punished or sued for using such material. He said there could be no difficulty in finding the parties. It is only made at large establishments.

JOHN I. POTTER said it was a deception and fraudulent and not sold on its merits. The hog-fat, of which it was largely composed, was not cooked.

A letter was read from Livingston, of New York, one of McGahn's lawyers, and he says that the decision was in favor of the constitutionality of the law. That they were not going to carry it to the court of appeals, as stated in the papers, because it was started before a magistrate, and such cases are not allowed to go to the court of appeals; and, on another ground, they are working on a patent, and they feared to take it before the United States Court for fear the patent would be dissolved.

Another gentleman said that the sale of bogus butter is increasing so much that we will have to sell our cows; it will kill the dairy interest.

Another was in favor of protecting the butter-makers, and said that bogus butter is sold in the little towns up in Jefferson county.

M. C. Beebe was in favor of prohibitory legislation for preserving the public health. It is a fraud and they should not sell it. Every one says it is manufactured out of stuff which must be derogatory to health.

Mr. Beebe offered the following resolution:

"*Resolved*, That it is the sense of the State Board of Agriculture for the prevention of deception in the manufacture and sale of dairy products, and for the preservation of health, this Board favors a prohibitory law, and requests the Legislature to pass a law to that end."

That was ably discussed and passed.

Having stated these facts, which have occurred so recently, I think the matter is before you for discussion.

A Legal View of the Case.

M. C. BEEBE. Mr. Chairman and Gentlemen: The substance of what transpired has been given by Mr. Hazard in the reports, the substance of the discussion and the unanimous conclusion, without a dissenting voice in the State Board of Agriculture, with a large representation of both dairymen and dealers present at the meeting.

I confess when I first heard of the means being used, and the legislation being asked for, not having given the subject any particular examination, I thought prohibition would not be feasible or legal. But, gentlemen, in the matter of social organization and mutual protection, there are three things that are the legitimate subjects of law: The preservation of the public peace, the preservation of the public health, and the preservation of the public morals. And that is the reason why I asked our friend, Professor Chamberlain, to-day, after he had expressed the opinion that suine and butterine were frauds and deceptions in their manufacture and sale, and no doubt detrimental to public health, why it was that he feared legitimate legislation could not be had, or legislation that would be sustained by the courts, after looking at the New York law, which was enacted by the Legislature and approved by the Governor after a long discussion, in which evidence was heard by the committees of the disastrous effects of oleomargarine, even upon the flesh and nails of the manufacturers who gave testimony, and the additional testimony of the fat gatherers as to the compounds put into it, I thought the New York dairymen needed a little legislative or judicial instruction in giving a title to that act. The act said nothing about its being detrimental to public health. It seemed to me, from my recollection of the act, for the protection of dairying and dairy interests, was not right. I observed that our friend, Mr. Reeder, who made this report, and who drafted the act, had followed it, and said "An act for the protection of dairying."

Now, it suggested itself to me, from a legal stand-point, and I said to him, "My friend, why should not I, as a lawyer, draw up an act for the protection of a lawyer or a physician in his profession, as against another class who are undermining him by a little more ingenuity?" I thought the act was weak, and I say to you, gentlemen, that you should forbear legislating upon the probable results of the New York act, if you are not certain of its affecting you, particularly if it is predicated upon what they say, that is, to prevent the manufacture of all goods. That was supposed to be substantiated by evidence, and, had that been embodied in the act by the legislative mind after the investigation, it would have been right. Had that been done, you would never have seen it passed upon by the Supreme Court of New York, which is not the higher court.

In the State of Missouri, prosecutions were instituted and carried through the courts, and the oleomargarine men make money, gentlemen, for they were able to give Roscoe Conkling ten thousand dollars to go out and argue the cases before the court of last resort, but they came out defeated.

If we are not to have prohibitory measures, what are we to have? We have had on the statute books, since 1877, a law restricting this thing; a thing upon the market to be sold for what it is. It has had the effect of bringing the combined powers of oleomargarine together for the purpose of scheming and putting upon the market their stuff to deceive the people. It deceives the chemist. Just so with many other adulterations. We must strike at the root of all these evils.

They say adulterations and genuine articles shall be put upon the market and sold for what they are and what they are worth. There are a great many innocent adulterations. The power of the chemist has been brought to bear, and our State Chemist tells us adulterations are innumerable. To avoid the statute, they are made harmless. For instance, our microscopist tells us that he found black pepper adulterated with the hulls of buckwheat bran and other things.

Legislation upon these matters is of very little importance until public sentiment is brought to bear against them and rectify these abuses. But, say our friends, let us have a restrictive law and enforce it. Here sits our State Chemist. I do not know his views; but I have had interviews with chemists, and they have told me that it is so perfect an imitation that it is not in the power of chemical analysis to tell the various parts the butter is composed of. Who is here that would sit down, after reading an investigation of the compounding of oleomargarine, and, finding the stamp right on it on the plate, eat it. The truth is that, by look, and taste, and make, you think it is butter. That is where the trouble is. While it may cost twelve or fifteen cents a pound, they sell it for thirty-five cents. You, as farmers and butter-makers, how are you going to compete? It is also demoralizing to public morals, and you, too, should remember the prayer, "lead us not into temptation," and have an enacting clause by which this substitute shall not bring you down to this degrading condition.

The Constitution of Pennsylvania does not allow the appointment of State commissioners. At the time the Constitutional Convention met, Pennsylvania had been over-ridden by appointed men, and it became a stealing privilege, and, perhaps, they went too far when they said no State commissioner should be appointed, but that the counties might have it. That was the wisdom of the Constitutional Convention, composed of ex-Governors, judges, and officials. We have all the State of Missouri has. We cannot have a dairy commissioner in Pennsylvania with thirty thousand dollars to back him as a State inspector, but I apprehend the law can be made (at least, we did not design in that convention to prevent good legislation) to establish county or local inspectors, or it can be made the duty of the policemen and constables of the townships to make return, as they do upon the license question, under oath.

General Discussion.

Mr. **Greene**. May not our present law be enforced by this present means?

Mr. **Beebe**. Yes, sir. You have these present means of enforcing it, but if even our chemists cannot detect it, except by catching them, you have very little chance of enforcing it.

Mr. A. M. **Fuller**. Mr. Chairman and Gentlemen: Many of you remember the law presented to us four years ago for our indorsement. There were provisions in that law which we did not see fit to approve, and it was returned to the Legislature without our approval.

The second law submitted, and which was the one referred to by Mr. Beebe, should receive our indorsement, as well as that of the State Board of Agriculture—governing the manufacture of imitation butter.

The question comes down to a prohibitory law. To be sure, New York State and New Jersey have adopted the prohibitory law; it remains to be seen whether that law is constitutional. I have reason to say that there is a doubt whether the court of appeals will declare that law constitutional. I fear they will not. I base my remarks upon information which I have received from a source of undoubted integrity, and the reasons given me are the same as those given on the tenement-house cigar question, decided recently. Consequently, we may get a contrary decision in regard to the constitutionality of this law; if we do, we can see then that a prohibitory law would be of very little effect. It is because of the fact that they have a dairy commissioner that it has any effect; without him it would be of very little effect. I have information by letter that the sale of imitation butter has been restricted seventy-five per cent. through the dairy commissioner having in charge the enforcement of the present law, but they do not believe the law could be enforced without the commissioner. We are told that it is contrary to the law of this State to appoint a commissioner; I would not have much confidence in leaving the matter to the constables and police.

I cannot see that we can do any better than to indorse the action of the State Board.

The **Chair**, (Mr. L. C. Magaw.) You gentlemen here are mostly farmers. Oleomargarine does not worry you a particle; you have butter at home; but there is no doubt in my mind that the majority here ate oleomargarine for their suppers. I can show you a splendid sample of it at my place, but we should not be deceived. I am aware, for instance, when a jobbing house offers me whole pepper at twenty-five cents a pound, and pure ground pepper at fifteen cents, it cannot be pure. When you call for butter, pay for butter—you expect to eat butter. The substitute is so close that it is almost impossible to detect it; therefore, prohibit.

Mr. HAZARD. I think this resolution, as brought before us, ought to be passed. By sending this resolution to the House, we show the members that the majority of the butter consumers are in favor of a prohibitory law. Let the Legislature pass it. I do not think we are risking anything about it. At the meeting of the State Board, Mr. Reeder brought two samples of oleomargarine there. I tasted it and felt sick all afternoon. It lingered with me giving me a pain in the head. Others were affected the same as I was.

Prof. JORDAN. I did not eat oleomargarine at the hotel this evening. I ate butter, which was very much like nectar to me. It melted away on my tongue. It came from friend Sibley, who very generously sent some to our table. I appreciate good butter; anything I say I should not be judged as desiring to hurt the dairy interest. All our animal fats are mixtures. Chemistry works as actively in the interest of oleomargarine men as it does in the interests of the butter-producer. They know how to mix the fats composing butter so that there is almost the same proportion of fats in the bogus butter that are in the true butter. All the chemist can do is to determine the amount of these fats. If I make an analysis of either, and do not find the proper percentage of fats, I can say it is not good. The oleomargarine man can say, " We have almost the same proportion of chemical compounds in our butter that the farmer has in his. If one is injurious, the other is injurious." And that is the fact. If oleomargarine butter is made up pure, the material is very much the same thing as true butter. It is no more injurious than the other, provided it is made up out of healthful, clean, sweet material to start with.

Something was said about oleomargarine eating the nails and flesh of those who engaged in the manufacture. The manufacturers use nitric acid to wash the fats. If it were not completely washed out of the oleomargarine, it would injure the stomach, and it could not be swallowed.

I make this statement because I do not think the farmers want to go into this fight on false grounds, and the statement that this oleomargarine butter cannot be made perfectly harmless to the public health is a statement that will not hold water, because it can be done. I do not state this in the interest of the oleomargarine people. The danger is that unwholesome material will be used. I do not know whether *trichinæ* could withstand nitric acid. Certainly, using material without the certainty of having them killed is a danger to public health.

A few months ago, I was very strongly in favor of a restrictive law, but if it is best, let them enact a prohibitory law.

Mr. GREENE. I should deprecate any action by this Association that is not well considered. There have been more blunders made in regard to the sale of oleomargarine and bogus butters than any other questions, except the liquor question. The liquor question has been one series of blunders in our legislative halls. Liquor laws have been enacted, and they have failed in their purpose. All temperance men believe this. This is because the persons who drafted the bills did not understand the use of the English language, or because they understood it too well. There has always been a loop-hole to get out.

Three or four years ago, in the Legislature at Albany, within three or four days, seven bills passed relating to oleomargarine, but the oleomargarine slipped through unharmed. There was not one of those laws that had the weight of a fly in its effect. As to the New York prohibitory law, it is in support of the dairymen at large. I was present at the State Dairyman's Association of New York. There was a letter presented from the person who composed that bill, asking certain amendments, and suggesting what they should be. I think he wanted six or eight amendments to his law formed a year ago. It shows how frail men are—drafting a bill upon which is supposed to hinge the welfare of millions of people. The law is utterly unsatisfactory to its author.

In the present attitude of affairs, it does seem to me that we can wait a little. The New York Legislature has gone so far as to pass a prohibitory law. The dairy commissioner, Mr. Brown, was present at the State convention, and occupied considerable time stating his position. He is an intelligent gentleman. He said to the dairymen: "I hope you will think twice before you ask for amendments to that law. We do not know whether it is constitutional or not; it is not for me to inquire. I am acting on the assumption that it is law. You see certain objections. I beg of you, do not open the door to amendments. If you open the door, the enemies will come in with amendments, and cover up that law so deep that you can never find it." In accordance with his advice, they passed a resolution asking the Legislature to await the action of the courts. It may be well for us to act wisely and wait. We have heard that the sale of oleomargarine has been reduced from seventy-five to ninety per cent.

One of the weak points in that law is that it forbids any man selling milk from which the cream has been taken. One gentleman said it works a great mischief to him, as he would gladly buy skimmed milk from his neighbors to feed calves, but he is forbidden so to do.

I do not know that we do any harm in passing this resolution, which has been passed by the State Board. I do not know that it will do any harm to keep our legislators thinking of this matter, and keep them studying. They will need all the wisdom they can bring to bear upon the question.

Obliterating Dark Lines.

Mr. JOHN COLE. As many of you know, this has been my hobby, if I had any, for many years back. I have always raised my voice against the traffic in this nefarious stuff. I am glad this question has come up, because I wish to see the Pennsylvania Dairymen's Association amend some of its former acts upon this question of oleomargarine. I do not wish to censure any of the members of this Association. I look upon this Association as an institution capable of doing good, but, upon this question of oleomargarine, it has acted unwisely. If there is a dark line written upon the pages of the history of the Pennsylvania Dairymen's Association, it is written upon that page where they placed a gag in the mouth of every man who dared to open his mouth against this traffic.

There is a dark line written upon the pages of the history where there was a resolution before the Association in regard to suppressing oleomargarine, and it was voted to lay it on the table; and it was announced by the Secretary of the Association that it was passed unanimously. I think that was a mistake, because there was one "nay."

Members of the Association, it was argued from time to time, when the question was before you, that this matter could be regulated by manufacturing a superior quality of butter. We needed no legislation. We must run oleomargarine out by making a genuine article of butter. It has been declared that it has reduced the price of genuine butter from ten to twelve cents per pound. Is it because we have not raised the standard of our butter? It has been said by members of this organization that this thing would regulate itself. We must raise our standard. One man says, "I see the hand-writing on the wall, 'come up higher, or butter made from the offal of slaughter-houses and pig-styes will take your place.'" Let us pass the resolution that is before us, and we can redeem some of our former credit.

Mr. SPITLER. If an imperfect law will drive oleomargarine out of New York, I am in favor of the same means to drive it out of Pennsylvania.

Mr. COLE. It is recommended by our Secretary that we keep still. Shall we keep still while the other States drive it over into Pennsylvania? No, dairymen, I appeal to you. Let us drive it on into some other State.

Mr. ODELL. I move you, Mr. President, that this Association indorse the recommendation of the State Board of Agriculture, which we have heard read.

The motion was seconded and passed unanimously by the Association.

Experiment Station Discussion.

Mr. A. M. FULLER. Mr. President and Gentlemen: I wish to speak of an experiment station. The State Board recommended that we have an experiment station. Two years ago, a law was passed, establishing an experiment station in connection with the Agricultural College, but that law was vetoed by the Governor. The subject of an agricultural experiment station was considered a year ago, and we took some action at that time. In the mean time, we have secured a copy of the New York law, establishing a station there, and we have placed in the hands of our member of the Senate, and our members in the House, an almost exact copy of it. It was presented in behalf of this organization, and this organization is responsible for it. The law was presented at the opening of the session. Others have been presented, but I am in favor of supporting the bill which we have placed in the hands of our representatives. I have no objections to the institution being established in connection with the State College, but am in favor of its being located geographically in the center of the State and not twelve miles off a railroad. I think it is well to give the law presented our indorsement.

I desire to read the recommendation offered at the meeting of this Association in 1884:

To the Committee on Agriculture in the Senate and House of Representatives:

WHEREAS, At the annual meeting of the Pennsylvania State Dairymen's Association, held in the city of Meadville, February 13 and 14, 1884, the subject of agricultural experiment stations was fully and carefully considered. and, as a result of this discussion, it is recommended that a State agricultural experiment station be established in Pennsylvania, and that it be patterned after the best models. We believe that the benefits to be derived from experiments in agriculture which establish facts and methods of great importance to farmers, and which have proved of great value to the agricultural interests of the States where experiment stations have already been established, warrant us in recommending that a like institution be established in this State; therefore,

Resolved, That we most earnestly recommend to the Governor, our Senators, and Representatives the advisability of establishing an agricultural experiment station in this State;

Resolved, That a committee of five be appointed by the Association to present these resolutions to the Governor, our Senators, and Representatives, and they be requested to use every effort to carry out the suggestions herein set forth, to the end that Pennsylvania may possess an agricultural experiment station which shall inure to the benefit of the agricultural interests of the State.

Mr. Chairman, I offer these resolutions which were offered a year ago, and move that they stand as the sense of the Pennsylvania State Dairymen's Association.

The motion prevailed unanimously.

On motion of President Fuller, the following was also adopted:

WHEREAS, An effort is being made to incorporate an agricultural experiment station with the State College;

And whereas, It is believed that the usefulness of an agricultural experiment station will be greatly enhanced by locating at some point more accessible than the State College, and as an independent institution; therefore,

Resolved, That we do recommend that the question of location be left open with a view of locating the station on a main line of travel where it will be most accessible.

Mr. FULLER. The recommendation of Dr. E. Lewis Sturtevant, director of the New York agricultural experiment station, is as follows:

"I only wish that your people, and not your people only, could think as I do, how little consequence it is where the station is located, provided only that it be *accessible*, *convenient to population*, and of a proper exposure, *i. e.*, the land level, or reasonably so, and of proper character for the work in hand."

Road Laws Discussed.

The CHAIR announced that the next question in order was that of a road law, and called upon Mr. Hazard to open the discussion.

Mr. HAZARD. Mr. Chairman: The State Board has had the question of a road law under discussion for some years. At a late meeting, Judge Benson, of Somerset, was present and offered a bill relating to roads, highways, and bridges. It provides that the commissioners shall meet and assess the amount of road taxes, not to exceed seven mills. He thought that about one dollar of that tax could be worked out by each party, and that, also, if necessary, an additional tax of three mills might be levied; that the commissioners had a right to collect about one fourth in cash. The present law allows parties to work out taxes. Under certain circumstances, when they asked for money instead of labor, it has been decided they could not collect the money. Under this bill, the supervisors shall have the power to purchase such tools and hire such men as they deem necessary, and shall keep the tools in repair and always in good order. It shall be their duty to keep in good condition the roadway, make it at least fourteen feet from edge to edge, the road raised in the middle, keeping loose stone down. Repair during the summer; fill up all ends and abutments. There shall be nothing to prevent their laying out and contracting, if they think best for the public good. Nothing shall relieve them from the responsibility of law in carrying out their duties.

Gentlemen who were present at the State meeting gave their views. Some of them said it was a law under which we could have roads cheaper and better, and that it should be managed just as railroads are managed, with the best workmen, and these workmen should be constantly employed.

Mr. BEEBE. The bill provided that the supervisors could levy seven mills and spend it upon the roads, and it provided then that if, on account of storms or floods, the roads were not in good condition that a levy of three mills might be made. I struck out the provision for storms or floods, so it would read in this way: a levy and expenditure of seven mills. I could not see why an additional levy should be made. We have had bills before the Legislature, and they have all gone by the board. With a view of helping out the present situation, I would collect, for the purpose of procuring improved machinery, so much in money—say one fourth. We have as good a law as this in the law of 1844, but the courts have decided that the men who have the opportunity to work out every cent can do so, and it left the supervisors no choice. We should, at least, have an enabling act, to enable the supervisors to collect money.

The discussion at this point took the direction of an investigation as to the road law at present in Crawford county, when, on motion, Messrs. Beebe and Findley were appointed a committee to report as to what road law is now in force in the county referred to.

Adjourned till Thursday, at nine, A. M.

THURSDAY MORNING SESSION.

The Association was called to order, President A. M. Fuller in the chair.

The CHAIR appointed Messrs. S. H. Findley, J. C. Sibley, and John Cole a committee on nominations for vice presidents.

Prof. JORDAN, of the State College, was introduced by the Chair, and delivered an address on the subject of

THE RELATION OF FOOD TO MILK PRODUCTION.

I feel that I am to discuss a subject to-day about which we have far too scanty knowledge. We know a great deal about the chemistry of food and of the animal body, and we can enumerate and describe the principal compounds of milk, but when we come to trace a connection between the food of the animal and the liquid that is produced in the gland called the udder, we face serious difficulties. It is, nevertheless, an important matter, and the active and searching discussion which has been devoted to the whole question of feeding for milk shows that its importance is recognized. I want, if possible, to indicate about where we stand in our knowledge of the relation of food to milk production. I am aware that in regard to some points involved in this subject there are conflicting opinions, and in some cases I think this conflict is more apparent than real.

Composition of Foods, Animal Bodies, and their Relations.

The subject naturally and necessarily divides itself into four heads:

1. The composition of cattle foods.
2. The composition of the animal body and of milk.
3. The relation of the compounds of the food to the compounds and processes of the animal body.
4. The especial relation of the food to milk formation.

I shall dwell upon the first two points somewhat briefly. Indeed, I speak of the chemistry of foods only because it is necessary to the proper development of my subject, and because I want to impress the fact that the farmer is dealing with compounds or ingredients, and not with food as a mere matter of bulk. It is not the pounds of food that is fed a cow, but the composition of the food, or what it contains, that will determine its effect upon growth of any kind. Just as in a fertilizer we estimate its value by the number of pounds of useful ingredients it contains, so we should judge of a cattle food by the amount of certain compounds in it that an animal can appropriate.

The extent of the difference between various cattle foods is great, but these do not exist because one food contains very much of any kind of material not found in every other cattle food. One food differs from another chiefly in containing the same constituents in different proportions.

There are four classes or groups of compounds that are common to all the ordinary materials consumed as food by farm animals. I say groups, because there are certain ingredients that can be classed together as being closely alike in composition, and in the work which they can perform in the animal body.

When any vegetable substance is burned, much the larger part of it is converted into gaseous compounds which disappear in the atmosphere, and is called the combustible portion. That which remains behind is the ash or mineral portion of the plant, and constitutes one of the classes of food ingredients. The other three classes are found in that part of the plant that burns away.

The most important of these, everything considered, are the albuminoids or nitrogenous compounds. They contain nitrogen which the other classes do not. Let me illustrate from common life what these bodies are. We are all of us familiar with such substances as lean meat, or the muscular tissue of animals, the flesh of fishes, the white of an egg, etc., and I presume that many of us have manufactured a cud of wheat gum by chewing up wheat kernels and continuing the process until we had left in our mouth a stringy, adhesive mass, or gluten. All these familiar substances are mixtures of albuminoid compounds, which differ from one another very little. There is a small difference between the composition of gluten and the flesh of animals, and, as we shall see, these various albuminoids have the same office in nutrition. Another class of compounds that make up a very large part of all common foods, both human and animal, is the so-called carbohydrates. With some of these compounds we are all very familiar, such as sugar and starch. There are several kinds of sugar, and each species of grain has a form of starch peculiar to itself. These and allied compounds constitute a very large percentage of all forms of vegetable food. The fiber, or woody portion of plants, is included among the carbohydrates, its percentage composition being the same as that of starch.

With the third class of combustible substances in the plant, we are still more familiar. Lard, tallow, butter, olive oil, linseed oil, cotton-seed oil, and several other vegetable oils, are fats, part of which are animal and part vegetable. There is, however, great similarity between the fats of the plant and those of the animal, and there is no plant that does not contain a larger or smaller percentage of these compounds. I have given as familiar an idea as I am able of the constituents of plants. Let us now turn to the animal.

A mere superficial glance at the carcass of an animal gives the impression that it is composed entirely of bone, muscle, and fat, which is not far from the truth. Compounds belonging to the carbohydrate class (the sugars and starch) are almost entirely absent from the animal body, the soft portion of the carcass being made up nearly exclusively of albuminoids and fats. The lean meat, or muscular tissue, is a mixture of albuminoids, principally albumen and fibrin, and, as I before stated, these closely resemble in composition and properties the albuminoids of plants. Lard, tallow, and butter, which are the natural animal fats, are very much alike in composition, being in every case mixtures of the same compounds, only in somewhat different proportions.

The bones, or mineral portion of the animal, are composed mostly of phosphate of lime, the substance which enters so largely into our commercial fertilizers. We should remember also that over half the weight of the ordinary beef animal is water, of which some portions of the tissues contain not far from seventy-five per cent.

Composition of Milk.

As we are chiefly interested in the question of milk production, I will speak somewhat more in detail of the constitution and composition of milk. In the first place, milk is nearly all water. An average sample of milk contains 87.5 of water, leaving only 12.5 of solid matter. The amount of solid matter varies greatly, however, ranging in normal milk from eleven to seventeen per cent. Among the causes that produce this variation may be mentioned the breed, the length of time the animal has been giving milk since producing a calf, the bodily condition, and the food.

The solids of milk are a mixture of quite a large number of compounds, some of which are found in only slight quantities. The principal substances in this mixture are casein and albumen, fats, sugar and ash, and they are found in the following average quantities:

Casein and albumen,	5.1
Fat,	3.5
Milk sugar,	4.3
Ash,	0.6

We have, then, in milk representatives of all the classes of ingredients that are found in cattle foods. Casein and albumen are albuminoids, milk sugar is a carbohydrate, and butter fat is a mixture of the same fats that are found in tallow and lard. The constituents of the solid matter in milk vary in relative proportion to as great an extent as does the total amount of solids. Breed, age, period of milking, etc., are some of the causes of this variation.

I have thus briefly touched upon the chemistry of cattle foods, of the animal body, and of milk, in order to discuss more understandingly the relation of the food to animal life and products.

Relation of Food to Animal Body.

The statement that all the material of the animal body has its source in the food, and that all the functions of the animal organism are supported by the food, needs no enforcement. Physically speaking, we ourselves are built out of our food, and our physical forces are but the equivalent of the force that our digested and assimilated food gives up. This, however, is only a general statement. We need to know, if possible, the office that each food ingredient has in producing and sustaining the animal body.

The principal substances that are formed in the animal body are the albuminoids and fats, and the most important functions of the animal organism are the production of heat and muscular activity or force. Among this variety of work which the food must perform, there is one thing that the albuminoids alone can do, and this is the production of animal albuminoids. Muscular tissue can have one source, viz: the albuminoids of the food. It must not be supposed that this is the only office of this class of nutrients. Animal fats and animal heats have in part their origin in the nitrogenous constituents of the food, and muscular force is related to these compounds in a way we do not at present understand. It was formerly the custom to speak of albuminoids as "flesh formers," giving the impression that the production of similar compounds in the animal body was their only office. This is not so. They have their distinctive office, to be sure, but, at the same time, they share in the work that is in part performed by other food ingredients.

The fats and the sugar and starch in food are used for the production of fats, and for the maintenance of animal heat and muscular activity. The carbohydrates were for a long time spoken of as heat formers, as though their sole office was to keep the animal warm; but they and the fats doubtless do contribute to this work to a greater extent than do the albuminoids. Later investigations have shown beyond a doubt that muscular activity is, to a large degree, maintained by the sugars and starch of the food.

Keeping up Natural Wastes.

It is not difficult now to see, in the light of the previous statements, that, figuratively speaking, a portion of the food consumed by the animal must be used simply to run the machine. Just as with a locomotive, a certain amount of fuel is wasted in making the loss of heat by radiation and in overcoming the friction of the machine itself, and which cannot be used for propelling cars, so with the animal, food is consumed in keeping up the heat and ordinary muscular activity of the body which cannot, of course, be used for the production of meat and milk. It is only the food that is fed above a certain quantity that can be directly applied to production by the animal. There is another fact to which I wish to call attention, one which follows naturally from previous considerations. If every class of the ingredients of the food has a somewhat special office in providing for the growth and nourishment of the animal body, the conclusion is natural, at least, that these food ingredients should be given to the animal in certain definite, relative proportions, if the maximum results are to be secured from a given amount of material. In the case of a milk cow, for instance, a certain amount of albuminoid material is absolutely necessary for the formation of the milk she produces, another quantity is used to make good the constant waste from the body, and still another portion goes to the growth of her young. All this material of a particular kind must be supplied by the food, unless the animal is to decrease in weight. Then there is work to do in maintaining the heat and activity of the body, all of which it is not only unnecessary for the albuminoids to do, but which can best be performed in part by the carbohydrates and fats. Observation and investigation have abundantly demonstrated that economy and the physiological conditions of the animal both demand that a certain relation shall be maintained between the quantities of the several food ingredients in the ration, and not only this, but that the absolute quantities of these ingredients shall come up to a certain standard.

Benefits of Science.

It is now time to ask what these relations and qualities shall be. How are we to arrive at them? We can only take the best conclusions that science so far has been able to reach. We can, at present, formulate nothing better than the German fodder rations as a sort of guide in the practice of cattle-feeding. These rations may be, and doubtless are, faulty, but any standards that are to take their place must be the result of investigation equally profound and extended.

The opinion which a German farmer expressed in the following words is a wise one: "As indications of what is best, they are invaluable; to follow them blindly would be folly." In this country, these rules or formulas, if they may be called such, have been wholly accepted and vigorously championed by some, and indiscriminately by others.

These rations constitute a recognition of certain facts and principles, only part of which have been touched upon, which I will briefly enumerate at the risk of repetition.

1. An animal uses a certain quantity of food simply to run the machine, only that which is fed in excess of the "maintenance ration" being directly applied to production.

2. Different classes of animals require different amounts and kinds of food, according to their size and use; as, for instance, the cow giving fifteen quarts of milk must, of necessity, have food different from that of an ox standing still.

3. Different food ingredients have different offices, and it is possible to compound a ration that will either fail to do the desired work or else will involve a waste of nutritive material.

4. In connection with the preceding facts, the great differences in the composition of foods are considered, and, also, the great variations in digestibility. These rations require that food shall not be fed with reference to bulk alone, but with reference to the available amounts of certain compounds.

A Balanced Ration in the Dairy.

Let us now apply these facts and principles to practice in feeding milch cows. The dairyman has at his command a variety of cattle foods, such as rough, coarse fodders, hays differing in quality, roots, the grains, and certain waste products that are found in the markets, such as wheat bran, oil-cakes, etc. From these materials, he must feed a mixture that will supply sufficient nutrients to run his milk machine. We can calculate approximately what this amount is for one class of ingredients at least. We will suppose that our cow is giving twelve quarts of milk per day, weighing twenty-five pounds, and containing, on an average, one pound of albuminoids, viz: casein and albumen, which must be formed into similar compounds in the food. If the cow be of medium weight, it will take at least half a pound of albuminoids daily to supply the necessary waste of the machine. Again, the butter fat, of which the average milk contains three and five tenths per cent., is produced in part, we are very certain, by the breaking down of albuminoids. As it takes two pounds of albuminoids to make one of fat, and as twelve quarts of milk contain nearly half a pound of fats, we are not likely to be far from right in assuming that one pound of albuminoids would be used for fat production. The sum of these various quantities of albuminoids that our cow would need daily is two pounds.

Now, in order that this two pounds of albuminoids in the food may do the required work, and not be used for other purposes, such as the production of heat, it is necessary that they be protected from destruction by the presence of a sufficient quantity of carbohydrates to do the work which sugar, starch, etc., can most naturally and most economically perform. For milch cows, the necessary daily quantity of digestible carbohydrates has been fixed at twelve pounds. We are not able to say now whether a little more or a little less may not be as efficient and more economical. If we add to this twelve pounds of carbohydrates an equivalent of fat that is always present we should have a ratio between the digestible albuminoids and digestible carbohydrates of one to five and five tenths.

Let us suppose again that the dairyman feeds his cows on ordinary timothy hay and fodder beets. The former would have on the average not far from three pounds, and the latter one and one tenth pounds of digestible albuminoids in one hundred pounds of material, while the accompanying quantities of digestible carbohydrates, or their equivalent, would be fifty and ten pounds respectively. If the cow were to eat twenty pounds of hay and forty-five pounds of roots per day, she would be furnished with not far from one and two tenths pounds of digestible albuminoids, and the equivalent of fourteen and five tenths pounds of digestible carbohydrates, daily. It is easy to see that such a ration is deficient in albuminoids, but furnishes an abundance of carbohydrates. It would be impossible to feed enough of the materials mentioned to furnish the required quantity of albuminoids daily, and even if this were possible, the carbohydrates would then be consumed in great excess above the necessary amount. With such a ration as the one assumed, either a good milch cow would fail to produce milk in the maximum quantity and quality, or the cow would lose flesh.

The remedy for the deficiencies of our ration of hay and beets is to substitute for a portion of one of these materials some more nitrogenous food. The most nitrogenous cattle foods are the oil meals, cotton-seed and linseed, while below these in a decreasing order come beans and peas, dried malt sprouts, wheat bran, oats, clover, hay, etc. The least nitrogenous cattle foods are poor hay, from the true grasses, the straws, including corn-fodder, and potatoes and roots.

If, then, there is fed with timothy hay and roots some oil-meal, the ration much more meets the demands of the milk-producing animal.

The general principle that should be the guide in securing a proper mixture of foods is this, that instead of combining those foods which belong to the same general class, viz: Those nitrogenous or those highly non-nitrogenous materials that are somewhat opposite in composition should be fed together, and thus the deficiencies of the two classes be mutually compensated.

Influence of Food upon the Product.

The question of the influence of the food upon the quantity and quality of the milk involves several interesting and important points, and is one, moreover, that cannot be considered apart from certain physiological facts. A former notion in regard to the formation of milk in the milk glands of the cow was that it is filtered out of the blood into the cavities of the udder. We now know that milk is nothing more or less than the liquefied udder, that it is the result of the breaking down of the tissues of the milk gland itself. Animal tissue, as well as vegetable, is composed of cells. In the surface portion of the membrane that lines the cavities of the milk glands, there takes place during the time that the animal is producing milk a rapid formation of cells, which fill with fat and break off and float in the excess of liquid. Simultaneous with the breaking down of the tissues of the udder is a formation of milk sugar, and so we have a liquid holding some substances in solution and some in suspension, which we call milk. These facts show that milk is produced from the food only as the materials of the food are first transformed into animal tissue, which then breaks down.

I mention briefly the main facts concerning the formation of milk, in order to show that the kind and quality of milk which an animal produces is in part controlled by constitutional peculiarities, and is not wholly determined by food or any other variable condition.

Relations of Food to Product.

We have seen that the constituents of milk are closely akin to the compounds found in cattle foods, and what is more natural than to suppose that by feeding fatty foods we should get milk rich in fat, or that from feeding food rich in nitrogenous material we should get milk rich in casein? This supposition would be in perfect accord with the idea that milk is a liquid strained out of the blood. But when we come to know that milk is a liquefied tissue, and when we consider that each animal organism builds up tissue in accordance with certain constitutional requirements and limitations peculiar to itself, it does not seem so probable that we can produce at will, by means of food, milk poor in fat or milk rich in fat.

Value of Experience.

Experience is the test of theory, however, and on the point under consideration careful and extended investigations are not wanting.

I know that the verdicts of German investigations have been much criticised, and even their correctness has been doubted; but I feel sure that some of this criticism and distrust has resulted from a misunderstanding of the facts as they really are. I have noticed within a few weeks in two of our leading agricultural papers, statements to the effect that the German experimenters claim that the quality of the milk is not influenced by the food. Nothing can be farther from the truth. The results of these searching and elaborate investigations declare, if they declare anything, that while in some respects a cow has certain fixed characteristics which are beyond the influence of the food, in other respects it may be greatly modified by the kind and quantity of the food. There is no farmer of ordinary intelligence who does not know that some foods produce milk richer in fat than is the case when other kinds of material are fed.

It would be useless to claim that one hundred pounds of milk from a cow well fed contains no more fat than one hundred pounds of milk from the same cow poorly fed, for all experience would deny the claim.

Practical Conclusions.

The following are conclusions which the German investigations certainly warrant:

1. The percentage of total solids in milk is greater with a rich ration than with a poor ration.
2. The composition of milk solids is, on the other hand, little influenced by the amount and character of the food. In other words, if these solids are one fifth fat with a poor diet, they will be one fifth fat when the cow is well fed, although the total quantity of fat will be greater in the latter case because the total quantity of solids is greater.

Let me illustrate. My cow gives milk with twelve pounds of solids to the hundred when I feed her on timothy hay and roots, but when I begin to give her a liberal amount of a mixture of cornmeal and cotton-seed meal, the percentage of solids increases until one hundred pounds of milk contains fifteen pounds of solids. The solids were one fifth fat in the first instance, and all previous experiments give me no reason to suppose that they will vary in composition under the influence of the richer ration. But one fifth of twelve is two and one half, while one fifth of fifteen is three, so that the liberal feeding has caused an increase of one half pound of butter fat to each one hundred pounds of milk.

This hypothetical case illustrates exactly what takes place in actual practice. A cow produces more milk when well fed than when kept on short allowance, but this is not because the solids of the milk change in composition, but because there is more of them. When one constituent of the milk solids increases, they all increase in about the same proportion. I do not mean to say that there is absolutely no change in the composition of the milk solids under the influence of different kinds and qualities of food, but I do mean to say that the food is unable to overcome, to any great extent, the fixed constitutional habits of the animal. You cannot by any manner of feeding obtain Jersey milk from a Shorthorn cow.

3. The formation of milk seems to be more directly dependent upon the albuminoids of the food than upon any other class of constituents. Within a certain limit the yield of milk, as shown by a number of experiments, was found to rise and fall in quantity and quality with the increase and decrease of the albuminoids of the ration, even when there was an abundant supply of carbohydrates; but a similar effect was not observed from varying the supply of carbohydrates in the presence of sufficient albuminoids.

DISCUSSION—BENEFITS OF SALT.

Mr. SIBLEY. I would like to ask the Professor, for the benefit of a great many of us here, what effect the use of salt has upon the health of our cattle and the product of their udder. I take it that salt is not used in any quantity that it should be used in our dairies. I know this, that we can increase the flow of the cow's milk very greatly by a liberal supply of salt, and I believe it helps the digestion of her foods.

Prof. JORDAN. I am afraid I cannot explain as fully as would be desirable. Salt is used in the digestion of the cow's food. The gastric juice in the cow's stomach is constituted partly of salt. An insufficient supply of that sort of material would prevent the animal organism from carrying out its functions. I imagine—in fact all the experiments so far show—that an increase of the supply of salt does not increase the supply of milk. I think the increase of the supply of milk is due to the fact that the animal is induced to take much more water rather than to the salt. That is my present view. Of course, I am willing to change it if wrong.

Mixing the Ration.

Mr. STURTEVANT. I would like to have you mix me up a few bucketsfull of feed. Take a calf that will weigh eight hundred and twenty-four pounds, dropped the first day of April.

Prof. JORDAN. Your judgment as to the amount is as good as mine—two pounds of cornmeal to one of cotton-seed.

Mr. STURTEVANT. How much dare I feed?

Prof. JORDAN. I should not feed the heifer at the present time over one to one and a half. We feed it at the College farms. We have seventy-five steers and eight to ten milk cows. We supply milk to the boarding-house and to the faculty. We feed two pounds of cornmeal to one of cotton-seed, about twelve pounds to a steer. We use the decorticate cotton-seed meal, which means cotton-seed meal from which the hulls are taken. Do not buy the undecorticated. We could buy it for twenty-five dollars and fifty cents per ton at the railroad station near us. The oil has been extracted, so there is but ten to fifteen per cent. left, when there was originally forty to fifty per cent. They are coming in these days to skim things on both sides. They are taking the oil out with benzine. Buy that which is the best. We do not give the cattle pure cotton-seed, two pounds of cornmeal to one of cotton-seed, and we are very careful not to feed that for awhile before the cow is going to come in, and very careful not to fed it after she has come in. I am a little afraid of it if the cow has a tendency to milk production.

Feeding Cotton-Seed Meal.

Mr. **SIBLEY**. I fed, a year ago last winter, fifteen tons of cotton-seed meal. I have fed as high as six quarts a day to a single milk cow. We feed it and have never met with bad results. We feed it to the entire herd. If we see a tendency to scour, we feed linseed in place of it.

Mr. **BEEBE**. I commenced feeding it and lost over one hundred and fifty dollars by the operation. The meal I fed still had the hulls on. I think we should be very careful to feed it in limited quantities.

Prof. **JORDAN**. We have fed over two hundred steers one third cotton-seed, and we have not lost a single animal. It may be that, from what has been said, some one has got the impression that I think it is necessary for farmers to use cotton-seed or linseed meal. I do not think it is necessary. If you are going to feed foods of that sort, they are good, but if you have your barn full of clover hay, the necessity is much less. Clover hay is a highly nitrogenous food. Cornmeal, clover hay, and wheat bran are all good. If you feed pure oil-meal it is healthy.

Mr. **GREEN**. I think Prof. Roberts, of Cornell, said he would not advise feeding more than two pounds per day.

Prof. **JORDAN**. He meant feeding other things with it. That would be six pounds of food. If you put in six pounds of meal, one fourth cotton-seed, that would be pretty good.

Mr. **SIBLEY**. Our practice is to feed it immediately upon removing the calf from the cow. It acts first as a physic for the calf. We give it to the calves as hot as they can take it comfortably. A little oil-meal tends to keep the bowels open. I should say a calf three or four weeks old will eat three to four ounces of linseed meal per day. We use eight to ten quart pails. We commence to feed skim-milk right away.

Value of Corn-cobs.

Mr. **MAGAW**. There is a certain amount of food used in this country that I think is wrong—ground cobs with the corn.

Prof. **JORDAN**. There is not much food in the cob. How much does it cost to get it ground? I do not think the cobs do any harm nor very much good.

Mr. **McMICHAEL**. What is the difference between the cob of the corn and the hull of the cotton-seed?

Prof. **JORDAN**. There is not a great amount. There is a large amount of wood fiber in both. Very little value for feeding in either. It is possible in the case of feeding an animal considerable corn-meal where the ground cob is with it, it may lay lighter on the stomach, and get chewed up better.

Mr. **SIBLEY**. I have had a little experience with feeding corn-meal. I took eight steers three years ago, commencing to feed a little meal at a time, until I got up to four quarts, and they began to scour; then I got corn ground with the cob, and it stopped them.

Mr. **HAZARD**. The experiments so far have been to discover that the corn-cob is equal in value to potatoes when ground with the corn. And the idea of some professors has been that it assisted digestion. There is a certain amount of saccharine matter in it.

A **MEMBER**. I would like to ask Mr. Sibley whether he used the old or new process of linseed meal.

Mr. **Sibley**. We have used both, but settled on the new. I find the new process is lighter colored. While it is perfectly tasteless and odorless, we think the calves do better.

Frequency of Milking.

Mr. **Sturtevant**. Can I make any money by milking my cows three times a day?

Mr. **Sibley**. We have adopted the practice in our dairy of milking our fresh cows three times a day for the first three months. I believe, in milking the cow three times a day, you break up more of the cells than by milking twice a day. We use the centrifugal separator. When we are making an examination we use the Cooley Creamery deep setter. We do not usually get enough to justify us for butter, but we get more cream. We feed our calves three times a day, but if the calf is weak we feed smaller quantities.

Harvest Suggestions.

Mr. **Green**. I think it might be suggested that three fourths, and perhaps more, of the harvesting is not harvesting at all; hence the poor satisfaction given in feeding. If it is not well cured it is not going to do its work.

Mr. **Beebe**. To cure clover, cut it down when there is no water on it; let it lie not over three hours, then open it to the air, and put it in the cock, and let it stand and sweat, then open it to the air, and put it in the mow, and it will not sweat again. By this method it can be put in more green than one would think. It must be cut on the first turn of the blows.

Value of Silage.

Mr. **Green**. I called at a dairy in Chautauqua county, New York, one evening last week, where I found a gentleman who said that he has sixty-five cows milking all winter. He milks them the year round, milking each cow about eleven months, manufacturing butter which he sells at seventy cents a pound. He has a silo, and last season he planted seventy-eight acres of corn. He has sixty-five cows, fifteen or twenty head of young stock, and thirteen head of horses on his farm. He said he did not know how he had done any farming without his silo. He could not keep his cows going without his silo. The cost per head of the sixty-five cows is four dollars and nine cents for ensilage. The cost for grain for wintering a cow from the first of October until the first of June, while giving milk, twelve dollars and sixty cents, an average of sixteen dollars and sixty-nine cents, this being the total cost of wintering a cow while giving milk. If a cow does not give milk she does not get grain. She is then wintered from the first of October to the first of June—eight months—on ensilage.

Mr. **McMichael**. I would like to ask how a man could winter a cow that long without grain.

Mr. **Sibley**. I think it is possible. In Venango county I have one bull that has not had, for two years, anything but silage. I do not believe in the last two years he has eaten ten dollars' worth. There is one thing we can grow, and that is corn. We put out last year thirty acres of corn-fodder. We had the ground in perfect order. We put the rows twenty-eight inches apart. We put in one hundred and seventy-five tons of corn-fodder from that thirty acres. We have fed from it at the rate of thirty pounds per cow a day since about the first or middle of October, and we have not fed one third of the fodder. The superintendent of the Hill farm tells me that the way it is holding out there would be over three hundred tons, besides the seventy-five tons of green fodder, put into that silo. I believed that has saved sixteen dollars a ton for hay. We have made two hundred acres support two hundred head of cattle.

This corn-fodder is chopped one third of an inch long, and, cut when new, it is sweet. There is a good deal of sugar in it, and there is an ear on every stalk. The corn grew from thirteen to fourteen feet high. I believe you can take twenty to thirty acres of corn and do more than with that much hay. We plant the white Southern corn.

Mr. HAZARD. We raise it and have most delicious meal on our table. The ears are broader, longer, and there are more of them. We feed the entire stock with it. Cut it up, and I consider it equal to timothy hay. We cut it up to about three fourths of an inch long, and feed hay with it. Moisten as we feed. The grain will then stick to the fodder.

As regards the value of cotton-seed meal, experiments were made in the State of Georgia by the State Board of Agriculture. The result was that the cotton-seed meal in the State of Georgia was worth twenty-six dollars per ton. After that, it got up to thirty-two dollars per ton. We have the same advantage in buying as they have. If it is worth twenty-six dollars at home, it is worth that much to us here. I consider that the hull is very injurious. A medical man in Chester made an experiment, and found that in the root of the plant there is a very injurious property. I think that is the reason that meal causes abortion. Where you get the bright meal, I am inclined to think it is very valuable.

I take my corn-fodder as raised and house it, and husk the corn as soon as possible. I endeavor to house it as soon as I husk it. I think it is injured just as much as clover hay by being left out.

Local Road Laws.

The CHAIR suggested that the time had arrived to hear the report of the Committee on Road Laws, and the report was presented as follows:

Mr. BEEBE. Your committee, to whom was referred the road laws of Crawford county, beg leave to report. We did not have time to investigate all the general acts of Assembly which are not found in the Digest, but we find by tracing the road laws of Crawford county down to 1854, when there was a general revision, and in 1855 there was some correction. It is said that the average legialator is but a reflex of the men that elected him, and I will say that the average supervisor is a reflex of the men that elected him. and the discharge of the duties is evidenced by the men they select. I must say, upon examination, I find that the average legislator is better. I am surprised to see you have a general road law sufficient to make your roads as good, and perhaps better, than you desire. I will say to make them four hundred per cent. better than they are to-day, if you utilize the law you have. Since 1854, you have had a law setting apart four road districts. The law of 1854 contemplated that it should be done by school-districts. In 1855, that was repealed. There were four districts and four supervisors who took charge of those districts, and they assembled and levied a tax. I find the act of 1854 enabled you to spend five mills, and if this was not sufficient, then ten mills. It was changed, and you were enabled to levy five mills additional. But you could levy that all in cash, if you chose, for the same purpose as the present suggested road law alleges—for the purpose of availing yourselves of improved machinery and such other expenditures as necessary.

The peculiar feature of the Crawford county road law is that you are allowed to levy a special poll tax. Every man is supposed to pay a poll tax.

That is why the tax is uniform. This assessment is made from the duplicate furnished by the county commissioners. You take that as a basis with the simple addition of a poll tax. By the act of 1855, the school-districts are no longer contemplated. The power of the office of supervisor implies the right to supervise and do those things necessary to carry out the provisions of the act. But I find it definitely that every person shall be notified of the time and place and manner of work that he shall be required to do, and that he shall do it under the direction of the supervisors. Your duplicates can be made out so as to be worked out by the 10th of August. In laying out roads, it must be done by petition to your courts. If a road has been laid by the board of supervisors, and it has not been run as contemplated by the act, as to whether the other supervisors have a right to change and lay out that road, I answer not, because they have no further power, they have no jurisdiction. If there is anything to be done, it must be done by resurvey and petition to court. I find that you have all you require. That the success or non-success of your roads in Crawford county is with you. If you are determined to have good roads, and you are determined to utilize the law you have, there is no reason why the average road in Crawford county cannot be made better four hundred per cent. But take your method of one bringing a shovel, another a hoe, and another a cart, and it is useless to talk about good roads. The road machines enable you to lessen your taxes.

Mr. A. M. **FULLER**. This question is a local question. This organization is a State organization. We had this question before us last evening, and I recommended the adoption of the road law prepared by the State Board of Agriculture. We decided to ask this committee to tell us what the road law of Crawford county is, and they have done so. It has given us information. I cannot see that there would be any impropriety in our adopting a resolution expressive of the prevailing sentiment upon the subject.

Mr. **COLE**. I have been of the opinion for some time that the men who were advocating the action were not fully acquainted with our present road law. That is why I asked the question last evening that I did, whether the supervisors had any power to collect tax. I find our committee has sustained my opinion that we had a road law sufficient. There has been an idea that the present system should be abolished entirely, and that the road taxes should be collected entirely in money. That is the opinion advanced by some. And then to have a road commissioner in the county and have it all collected and worked out under the supervision of one man. I have concluded that the present road law is not so bad after all.

Mr. **CULP**. Our roads need supervision. We generally work our road tax out in the fore part of the season, then the heavy rains come along and wash the ditches so that they are filled up and become mere mud-holes. A little labor in time would save a great deal. If the supervisors would appoint men to oversee the roads past their farms and keep the water off the roads, I think it would improve them very much. Change our present system of making roads. We have all the law we want.

Mr. **HAZARD**. If they had a road machine to go over it once a month, you would save hand labor. The road machine would save in cost over twenty-five cents on the dollar—furnish teams for your road machine.

Mr. **BEEBE**. Upon refusal to pay taxes, judgment can be entered against the party refusing and proceedings had to collect. The taxes collected in cash go into the treasury for use. The supervisors are controllers and directors of the road, and this fund not spent can be utilized during the year.

Mr. **MCMICHAEL**. There is one weak point, and I call it the carelessness of supervisors. Some will refuse to work, and they let them go until the next year. The work is not done and the money not collected.

Mr. BEEBE. A supervisor has no need to complain to a justice of the peace. He can issue his own warrant.

The CHAIR. The original resolution may be adopted, with this additional recommendation, that the counties purchase road machines.

Mr. GREEN moved the adoption of the following:

Resolved, That we indorse the recent action of the State Board of Agriculture relative to an improved road law for the Commonwealth.

Resolved, That it is the sense of this meeting that we recommend to the supervisors of the counties that they levy a cash road tax sufficient to enable them to invest in improved road machinery, to the end that the traveling public may derive the full benefits of existing road laws.

The resolutions were seconded and carried.

Adjourned until one, P. M.

THURSDAY AFTERNOON SESSION.

The Association was called to order at one o'clock, P. M. President A. M. Fuller in the chair.

The CHAIR introduced Prof. S. R. Thompson, of New Wilmington, Pa., who delivered his address on

THE FUTURE OF DAIRYING IN THE WEST.

We can forecast the future of any industry only by considering its past progress in connection with the agricultural condition of the people by whom it is carried on. During the settlement of the great West, dairying has passed through several stages, which may be, for convenience, divided into three.

During the pioneer stage, grain-growing is the principal business of farmers. A few give some attention to raising stock. Each family keeps one or more cows, and some butter and cheese are made for home use, and to supply the villages.

In the second stage, the country has become more thickly settled; facilities for making and keeping dairy products are more abundant; increased facilities for transportation have opened up a wider market, and the industry assumes a more commercial aspect. In the vicinity of the larger towns, farmers, able to make a good article of butter, find it profitable to furnish it to regular customers for their own consumption, and usually at a stipulated price for the entire year. Of butter sold to the dealers for shipment, much is poor and brings a low price, affording little profit to either maker or dealer. In this stage, as in the earlier one, stock-raising and grain-growing constitute the principal business of the farmer. Dairying is only incidental.

In the third stage, the population has become more dense, capital more abundant, and dairying, from being an incidental, becomes the principal business of many farmers. The value of uniformity of product in securing a steady market and high price is recognized, and leads at once to associated dairying. Cheese factories and creameries are erected, and the manufacture of dairy products becomes a special business of a manufacturing class, while the farmer confines himself to the production of milk. Not all places go through these stages at the same time or with equal rapidity;

some reach the third stage much sooner than others. Within a few years, many places in the West have advanced to the third stage with great rapidity. This may be illustrated by a few statistics. "Willard's Dairy Husbandry," published in 1870, reports but one cheese factory in Kansas, though, doubtless, there were some few others. In 1877, in forty-three counties factories were found, in which eight hundred and fifty thousand pounds of cheese were made. In 1877, Kansas made eleven million pounds of butter; in 1878, thirteen millions; in 1884. twenty-six millions, thus doubling the total amount made in a period of six years. During the time of this rapid increase in the production of butter, the amount of cheese made was diminished. From 1878 to 1884, while the population had increased forty per cent., the production of cheese had diminished nearly twenty per cent.

The Establishment of Creameries.

An important feature in the changes of this period was the establishment of creameries. In 1878, no creameries were reported in Kansas. The State report for 1880 gives forty-eight factories, in which eleven thousand four hundred and thirty-two pounds of butter were made. It will be understood that these factories were for cheese, that being their principal product, and only a comparatively small amount of butter was made in them. Four years after, in 1884, fifty-four out of eighty counties in the same State had creameries in which during the year one million two hundred and thirty-one thousand pounds of butter were made. One county, in 1878, reported the production one hundred and thirty-five thousand pounds of butter; six years after, the amount was six hundred and seventeen thousand pounds, of which two hundred and ninety-five thousand pounds were made in creameries. This rapid progress was not confined to Kansas. The first creamery in Illinois was built in 1870; in 1880 there were two hundred and eighty-eight, and in 1884, four hundred and fifty. Iowa, in 1880, had two hundred and forty-four, and now has more than double that number. The first creamery built in Nebraska was in 1878; the census of 1880 reports twenty thousand pounds of butter made in factories. The number of creameries now in existence in that State I have not been able to ascertain, but there are several single creameries, in each of which four times as much butter was made last year as the entire product of the creameries of the State in 1880. The circumstances which have retarded the development of the interest in the West are, in many particulars, not different from those met with in the East.

The difficulties are in part due to the rapid settlement of the county, in part to its peculiar condition. When the country is first occupied, the abundance of native prairie grass seems to render the cultivation of tame grasses unnecessary. During the months of May, June, and July, the prairie grasses are unexcelled in nutritive qualities, but after the first of August, the native grasses usually become somewhat tough and are not nearly so well adapted to promote a flow of milk as in the earlier part of the season. Besides, the season during which cattle may pasture on tame grass begins at least a month earlier and extends a month later than is possible with the native prairie grasses.

Importance of Tame Grasses.

An illustration of this condition is, I have seen it stated, that one factory received two hundred and thirty-five thousand pounds of milk in July, and but one hundred and eleven thousand pounds in October. Another factory made five thousand pounds of butter in August and but six hundred in September. In both these cases, the cows were pastured principally on prairie grass. A conviction of the importance of tame grasses to render dairying profitable is fast changing this condition of things, and the area occupied by tame grasses is rapidly increasing. For example, Kansas reported, in 1878, forty thousand acres of tame grass pasture, and in 1884, two hundred thousand. Of tame grass meadows, the amount reported, in 1878, was one hundred and eighty-four thousand acres, and in 1884, eight hundred thousand acres. This may safely be taken as a sample of the development of other Western States in the same direction. It may be remarked that the cultivation of tame grasses in the States west of the Missouri was for a long time retarded by the unfounded belief that cultivated grasses would not thrive in that soil and climate. This belief once dispelled, their cultivation has been undertaken with confidence and carried on with vigor.

In dwelling on the value of tame grasses to the greatest profit in dairying, I would not seem ever to disparage the native prairie grasses. In their season, they furnish a rich and nourishing pasturage, and one that will put fat on an animal as fast as any grass I have ever seen. But this is only true of the best season. After the beginning of September, or about that time, the prairie grasses become tougher and less nutritious than they are earlier.

It must be understood, also, that I speak of the grasses found in the cultivated parts of the West, and *not* of what is commonly called "the range," a region for the present lying beyond the cultivated region.

If we seek the causes that have occasioned this rapid extension of dairying in the West, we will discover one of the most important to be the great distance these States are from market and the consequent necessity for reducing the cost of transportation by diminishing the bulk and increasing the value of agricultural products.

Cost of Transportation.

For example, to illustrate this point: To transport one hundred pounds of butter from Omaha to New York costs one dollar and fifteen cents; one hundred pounds of beef, eighty-seven and one half cents, and the same amount of corn, forty-nine cents. This difference in the cost of transporting the more valuable and concentrated products as compared with the more bulky will be still more obvious when we compare the value of one hundred pounds each of the things mentioned. One hundred pounds of butter at Omaha is worth from twenty-five to eighty dollars; same amount of dressed beef, eight to ten dollars, and of corn from forty to fifty cents.

So throughout the West wherever this point is appreciated, every year a greater effort is made to condense the bulky products of the soil, such as corn, oats, and hay into beef, pork, butter, or cheese, thus as far as possible reducing the relative cost of transportation.

A second reason for this rapid growth is the discovery (for with many it is a late discovery) that it is possible to combine stock-raising with dairying and procure a greater profit than with either separately. Especially is this true where only the cream is sold and milk is kept on the farm to feed young calves and pigs.

The fats in milk, which are taken out with the cream, can be supplied from other sources much more cheaply than by feeding the whole milk.

A third reason for the increase in dairying is that, as the country becomes older, the wheat crop, which, for the first few years after the prairie is broken up, is the principal crop, becomes less certain and less remunerative, but while the land becomes less suitable for wheat, it is benefited for the growth of corn and other kinds of cattle food. These conditions stimulate greatly the business of stock-raising as well as dairying.

Taking into account, then, the late rapid increase of dairying in the West in connection with present condition of that region, we may safely predict that the business is likely to be greatly extended in the near future.

For those who understand it, there is now in the West no line of productive labor which is more certain to afford satisfactory returns than that of dairying in conjunction with growing first-class stock. I can speak from my own personal experience when I say that it is profitable to raise the best grade of young stock on skim-milk. And where cattle food is as cheaply grown as in the West, a moderate price for butter will bring a remunerative return. For the present, much of the dairy product of the West finds a market in the money regions among the Rockies, but some of it goes east to New York.

The day being far advanced, discussion was omitted, and Mr. J. B. Close, of Harmonsburg, Crawford county, was called upon for an address on the subject of "Farmers' Clubs," which was as follows:

FARMERS' CLUBS.

PAPER BY MR. J. B. CLOSE, *Harmonsburg*, *Pa.*

MR. PRESIDENT AND MEMBERS OF THE ASSOCIATION: We live in a progressive age, and success must be fought for by keeping up with the times. The old fogy wonders why things are not now as they formerly were, and sighs for the good old days of yore, while the wide-awake man of business drives ahead, almost regardless of consequences, and makes times lively and the country prosperous, although circumstances are sometimes against him.

It is true, that with our dashing, go-ahead, Yankee enterprise we sometimes run upon rocks and sand-bars, and that at all times some are going down while others are coming up. But the cry is ever onward, and the successful man is not he who looks back and longs for the flesh-pots of Egypt, but he who profits by the experience of the past, who fights, manfully, the battles of the present, with a firm determination to bring success out of the future.

The successful man must necessarily follow, to some extent, in the paths of those who have gone before him. But with him improvements are always in order, and by keeping eyes and ears open. thus profiting by every lesson within his reach, he goes along, not madly, but cautiously, both learning and teaching, and is finally enabled to reach the goal of his ambition.

But success pre-supposes work. Desire to avoid the facts as we may, yet it remains a fact that hard work of hand or brain, or of both, is necessary to success. Buying lottery tickets and drawing a prize is not business. It does not benefit the country. The one among ten thousand who has drawn the prize has learned nothing and taught nothing. It is not success. Mere money-making ought not to be, although it often is, the only object aimed at in the business pursuits of life. Our object ought to be to make some steady advancement, to grow wiser and better as we grow older, and to be daily led nearer to Him who has given us both the ability and opportunity for advancement. A life after this model is the true life, and such a life alone brings success.

The careful study of that business in which we engage and by which we expect to make a living is certainly the part of wisdom, and the wisdom of the farmer in studying his business can be plainly seen when we take into consideration the numerous subjects which it presents for study and consideration.

Origin of Farmers' Clubs.

The farmers' club, as an aid to this study, is the subject which we propose for a short time to discuss.

When the farmers' club was first established, history does not say, or, at least, I have been unable to learn the fact from my somewhat limited reading. No doubt, some time in the past, there lived one who, like our modern Odell, urged the farmers to organize clubs for their own benefit, and, possibly, like him, paid them something for doing that which was so manifestly for their own interest. In searching for the origin of this institution, I do not wish to go back so far as the historian who, in writing the history of a county in Missouri, went and commenced at Adam, but I would simply say that as Adam and Eve were agriculturists, if they had have had a farmers' club to use on the head of the serpent that beguiled them, they might have left their descendants in a far better condition than they did.

The first club of this kind of which, I think, we have any account, was the clubbing together of the brothers of Joseph, with the avowed purpose of selling him into Egypt, but, in my researches on this subject, I have been unable to decide whether that was a farmers' club or a dairymen's association. But questions of this kind we can pass by without much argument, as it is the farmers' club of modern institution which we have more particularly to deal with. What has it to do with the success and welfare of the farmer? What part does it or ought it to play in the great business of agriculture? What good or what bad may be derived from it, and does the good over-balance the bad? These are questions, the solution of which ought to interest us as farmers. Yes, ought to interest every one, for the farmer is the great producer to whom the world looks for a living. I do not think this subject has been given me with the idea that I would study up and explain to you how the farmers' club may aid us in making more money, but rather how it may aid us in making that steady advancement which, while it brings more money into our pockets and makes us better farmers, will also make us better citizens, better neighbors, and better friends.

The Farmers' Club a School.

The farmers' club is, in one sense, a school, yet it is not one on which the farmer can depend for learning all that he ought to know of his business. The farm should be the place for studying the lesson, the club the place to recite. In this way, the lesson learned by one man may be taught to a neighborhood, and when each member of the club endeavors to learn something to recite at each meeting, the exercises become interesting and the benefits mutual.

There is no farmer but can learn something worth remembering each day he spends on his farm, and by repeating those things to his neighbors, he, at the same time, benefits them and stamps those facts indellibly upon his own mind. Said a neighbor, in conversation upon this subject, "You will get together and discuss those old stereotyped questions always discussed by farmers' clubs, and then your club will die." This, I believe, has generally been the history of clubs of this kind, but why it should be so I cannot understand, for if there is that constant study and experiment which there ought to be, the club should grow more interesting and instructive as it grows older. Experience is said to be a dear school, but it is the one in which the farmer learns some of his most valuable lessons, and it is important that these should be remembered and acted upon, whether they are lessons of success or failure.

One of the most pleasant duties, or rather privileges, of life is that of being of some assistance to those around us, and opportunity for so doing, taken advantage of with pleasure and alacrity, are among the things which tend strongly toward making this world worth living in.

That the farmers' club affords such opportunity cannot be doubted. The question is, will farmers take advantage of the opportunities thus offered them, and, while benefitting others, benefit themselves? The discussion of the various questions which come up in the mind of the farmer, or rather in his experience, as he follows his occupation from day to day, if engaged in by an entire neighborhood, must certainly materially assist them toward success, or help them to avoid that failure toward which they may be unwittingly steering.

It is an old, but now pretty well established, idea that any man will do for a farmer, yet it is probable that agriculture affords a better opportunity for all classes of men to engage in it than almost any other business. This, in connection with the fact that it offers one of the broadest fields for study and investigation, shows plainly the importance of a thorough study and discussion of every question relating to it.

Practical Benefits.

The farmers' club may be an aid to any community by bringing up these various questions for discussion, by causing thought and leading to experimenting, and in various ways assisting in that steady advancement which is so important, and which the times demand should be made. One great difficulty is to have farmers become interested in the discussion of their business. While the subject of fencing was up for discussion before the Summit Club, said one farmer, take up a subject that is interesting and I will attend your meetings. If the subject of fencing, with its immense cost and little profit, is not of interest to a farmer, what would interest him? How many farmers there are who make it a constant practice to spend their evenings in the village grocery discussing the slang and gossip of the neighborhood, and if we were to judge from the zeal with which they follow up the practice, we must conclude that it is to them highly interesting. What good might be accomplished if this zeal could be turned in a proper direction towards something beneficial instead of injurious. What advancement might be made in agriculture and improvement in the condition of the farmers if this same interest was taken in the study and discussion of their business. How to get farmers interested in the meetings of the club, is a question which has occupied much of my attention for some time past, and is with me yet undecided.

I would request the gentlemen who are to follow me in the discussion of this subject to give us their views on this particular question.

Conducting the Club.

Of course, there is much in the manner in which the club is conducted to make it more or less interesting. There should be earnest, energetic officers at its head, a wide-awake leader appointed on the discussion, an occasional change in the manner of conducting it, and last, but by no means least, the attendance and coöperation of the ladies. They have a way of doing this business over in our neighboring State of Ohio, and which, for convenience, I will call the Ohio idea, which very nearly meets my approval and which is well worthy of our consideration. Their meetings are held at private houses, which alone secures the attendance of the ladies, although the sessions are held in different rooms, if so desired, and among the other attractions presented by this method of doing business is that of a good, square dinner, and I cannot see why this attraction would not work equally well with Buckeyes or Pennamites. The only difficulty in the way would be the liability of all the interest of the meeting centering on the dinner-table, and this in time would work the certain destruction of most of the benefits intended to be derived from the farmers' club. Too many farmers, and for that matter too many other people, already carry too much of their brains in their stomach, a fact to which the dyspepsia of to-day will bear ample testimony. The sociability engendered by this method of conducting club meetings is a point very greatly in its favor. Greater sociability between the families of farmers would certainly tend towards lightening their cares and labors, to making home more pleasant, their business more attractive, and might greatly aid in solving that vexed question, how to keep the boys on the farm. The club can be of benefit to the farmer in more ways than simply assisting him in making money. It should work for the good of the farmer in every respect, and if it can be some aid in making more happy homes and more pleasant surroundings, and in making the farmer and his family more contented with their lots and better satisfied with their business, it has done a work well worthy of its organization. It may be an aid in making great changes in agriculture, which may be, and in the future no doubt will be, brought about. Our Western country has tried, probably to perfection, on its thousand-acre wheat-farms and cattle-ranges, the problem of extensive farming, and carried it away beyond the highest ideas of our old fogy farmers, yet who in all this wide domain has ever tried the possibilities of an acre? May not our business be so conducted, our large farms be divided, and all our farms be put in better condition, and, in general, "two blades of grass be made to grow where but one grew before," and agriculture be made to profitably employ double the number of persons now engaged in it, and may it not be possible that some time in the future "ten acres enough" for a profitable farm may be no longer visionary, but a firm reality? These are questions for the farmers' club and directions in which it may work for the benefit of the farmer. It is possible that the club's field of usefulness might be still further enlarged. Outside of these subjects relating to the work of the farmer, there is a wide field for study and discussion. Taking all these together, there might be presented to the farmers' club an almost endless variety of questions, the discussion of which may be interesting and profitable.

Subjects Worthy of Attention.

The selling of farm products, and buying the necessaries of life, the tools, and machinery needed on the farm are subjects well worth the time of the club to consider. Laying aside the subject of the profits of the middle man, who has already come in for his share of abuse, and who, in most instances, I cannot help thinking, is a necessary evil and whose business is generally honorable, if honorably conducted, there is yet the subject of necessity, both in buying and selling, the best shape in which to sell farm produce in order to receive the greatest profit, and are quick sales and immediate profits generally the most advantageous and profitable in the end.

Then, again, the utilizing of that which is generally, to a very great extent, a waste on the farm is a question at once important and interesting. There is, no doubt, enough allowed to go to waste on all our farms from year to year which, if properly utilized, might make a living for some poor families, or put money into the farmer's pocket. Another important question for the consideration of the club is the dog nuisance. Is there any use of, or any reason in, keeping the almost endless number of worthless curs with which the country is cursed? Taking into consideration the amount of damage they do, and the amount of profit that might be made by giving the care and feed that is now given to them to other and more profitable stock, it is very easily seen how important a question it is for the consideration of the farmer.

I do not hesitate to say that if the farmers' club could be instrumental in exterminating all the absolutely worthless curs in Crawford county, and turning the care and food given to them in a profitable direction, it would do a work which would add thousands of dollars to the wealth of the farming community, to say nothing of the comfort and satisfaction derived by the change.

Influence in Politics.

Again, the farmer being accustomed to wading in mud, he might possibly, at times, wade into the mud of political matters, and see if he couldn't be instrumental in calming, to some extent, the disturbed waters of politics.

By no means could I recommend introducing into the farmers' club the heated discussion of party politics, but how to avoid the disruption of business, apparently caused by every political campaign through which the country passes, is an appropriate subject for the club to consider. That it is not necessary that politics should thus disrupt business is plainly apparent, and, as it largely affects our rural population, it is certainly an important question for them to discuss.

That the whole country should thus suffer because a few men in each political party are striving to get into power is all nonsense, and it is certainly high time that a remedy should be applied to this existing evil. I would not say that the election of farmers to office would be a potent remedy, but I do say that the farmers of our country, through their well-organized clubs, may, if they will, become a power behind the throne greater than the throne itself.

Relations of Capital and Labor.

There is another question which bids fair to soon become an important one, that is, the enmity apparently existing between capital and labor. This is a question which, in my opinion, the farmers of our country must, sooner or later, take into serious consideration. The great desire on the part of many to become immediately rich, and to disregard the welfare of those who are possessed of any considerable amount of wealth, and on the other hand the disposition of trusted men to squander the accumulations of the poor, to build railroads without money, and to carry out schemes for their own benefit without regard to others, is creating a state of things, which, if not yet alarming, is certainly not desirable.

The free use of dynamite in the old country, and the advocacy of its use in this country by a few anatics, is giving us timely warning of an approaching danger, which may be averted from us if it receives our timely care and consideration.

Frauds and Humbugs.

But again, the numerous frauds and humbugs that infest our country, and whose inventors and advocates consider farmers their legitimate game, presents another broad field for the work of the farmers' club. Brought so prominently before the farmer and his family through the glaring advertisements in many of the newspapers that circulate largely in rural homes. makes this a subject of no inconsiderable importance. To such an extent has this been carried that it has become a fine point to decide how much we can believe of that which is set forth in a public advertisement. It is cheering, however, to know that there are some newspapers which do not knowingly advertise frauds and humbugs, and the farmer should require that every paper which he patronizes should be of this class. Were farmers' clubs organized throughout the country, and this question properly discussed in them, there might be compelled a purification of some of our newspapers that would be highly beneficial.

Making and keeping in order our public roads is another subject upon which we need line upon line and precept upon precept. This subject should be agitated before the farmers' club until there is an entire change brought about in the matter of road-making, and until our roads become a pride, instead of, as is now too often the case, a disgrace to the country.

Propriety of Organizing.

The propriety of organizing a county club has been hinted at. This is suggested, I suppose, by that old idea that if a little is good, more is better; but whether or not this would be a good principle to carry out in farmers' clubs, I am at a loss to determine. If such an organization is made, it should be in the nature of an institute, with the exercises consisting principally of lectures on agricultural subjects. and, really, I do not know but that our Dairymen's Association already fills the bill. This is only my opinion, and not worth much at best, but let me add, do not attempt anything for the benefit of the farmer that will take him too much away from his home and business. This is the principal objection I have to farmers' clubs in general. The place for the farmer, when his day's work is done, is by his own fireside, enjoying the company of his family, and if he leaves this for the club meeting, he should be certain that it will be a benefit for him to do so. A county may not be too large a territory for a farmers' club, but I am very much of the opinion that a school-district is not too small. It is sometimes said that the agricultural paper makes the club unnecessary, and while I would say, by all means let the farmer read the agricultural paper,—and let me whisper it low, he ought to pay for it before he reads it,—yet while he does the one, I cannot help thinking he ought not to leave the other undone. If the club is properly conducted, and an effort is made to have it interesting, and if it is made the medium through which to communicate to others facts learned by actual experience, it ought to pay large dividends on the investment. If the club can be instrumental in causing an improvement to be made only in the farm garden, that it may not be what it too often is, a patch of weeds, with an occasional vegetable striving hard for existence, but that it may be the center of attraction on the farm, a profit as well as a pleasure to its owner, the work of the club has been well worth its cost. But, again, the club may be instrumental in keeping before the mind of the farmer the fact that his business is honorable. There is too much anxiety on the part of many to get off the farm and go into business, as they term it, as though farming was not one of the grandest business pursuits in which man can engage. Are there those amongst our farmers who are inclined to grumble at their lots, because it is necessary for them to dress in overalls and soil their hands while engaged at their labor? I would say, take them to the club meeting and teach them to look upon the bright side of the picture—to see the position they occupy. Standing as they do beneath the blue arch of heaven, with a carpet under their feet woven by an Almighty Hand, and which in design and texture is beyond the power of art to imitate, who has the opportunity of studying the beautiful in nature that they have? Who is engaged in such healthful employment as they are? Upon whom are the blessings of God showered in such profusion as upon them? Teach them to look upon their business in its true light, and if they are led to mourn over the fact that the curse of sin has caused the ground to bring forth thorns and thistles, not to forget to rejoice over the promise that seed-time and harvest shall not fail.

The subject was discussed by George Spitler, John Cole, and others, all agreeing that as an educator of the farmer of the present, and more particularly those of the future, who are now the farmer boys, there is hardly any medium equal to the farmers' club, and that these organizations should be numerous and well-sustained throughout the entire country.

Committee on Utensils.

The Committee on Utensils reported that Mr. D. H. Lefever, agent of the Vermont Farm Machine Company, exhibited a creamer and churn of the most approved makes and well worthy of the attention of dairymen. Also, that a revolving barrel churn was exhibited, which possessed good merits. They found that the Warsaw Salt Company made an extensive exhibit of their salt, and placed a very generous supply of it in small sacks for free distribution.

Election of Officers.

The election of officers for the ensuing year resulted as follows:

President, Mr. A. M. Fuller, Meadville, Pa.

First Vice President, Willis P. Hazard, West Chester, Pa.; *Second Vice President*, John Fuller, Crawford county; *Third Vice President*, Leon C. Magaw, Meadville, *Executive Committee.*

Secretary, R. H. Odell, Meadville, Pa.

Treasurer, J. H. Lenhart, Meadville, Pa.

The following additional Vice Presidents were chosen, in accordance with the constitution: I. P. Thomas, Delaware; Milton Darlington, Chester; S. S. Spencer, Lancaster; J. C. Sibley, Venango; A. D. Beatty, Crawford; John Cole, Crawford; A. R. Sturtevant, Crawford; W. G. Moore, Berks; Col. P. B. Carpenter, Crawford; M. H. Terry, Erie; G. W. Carroll, Erie; Hon. M. C. Beebe. Venango; Alfred Paschall, Bucks; H. H. Harper, Crawford; George Blight, Philadelphia; Prof. W. H. Jordan, Centre; Joseph E. Gillingham, Montgomery.

On motion of Mr. Cole, the meeting adjourned *sine die.*

THE FUTURE OF THE JERSEY COW.

By G. T. Rankin, M. D., *Linesville, Pa.*

What is the future of the Jersey cow? is a question of great interest to those engaged in their breeding. Some wisacres assert that there is at present, and has been for a few years, a boom, which I suppose means an inflation—a stimulated price set upon them, greater than their real worth. Every article of commerce, placed upon a healthy market, is worth just what it will bring in cash in the market to which it is exposed. There are no laws in this country compelling the people or anybody else to pay more than they want to for an article offered for sale, either public or private; there is no law, human or divine, even in the new translation, compelling anybody to offer or pay two hundred or two thousand dollars for even a Jersey, but they still are worth what they bring in the market to which they are exposed. When "Princess 2d" brought at public auction four thousand eight hundred dollars, she was worth the money paid for her, as any other commodity would be if it brought the cash. When Mr. Fuller was offered thirty thousand dollars for the "Little Mary Ann of St. Lambert," as has been reported by the public press, and he did not accept the offer, she was worth more to him than was offered, so he kept her. And I believe that "Eurotas" has paid to Mr. Darling the interest on an investment of more money by the sale of her calves. But these are the aristocratic families, and are not for the common farmer, with his ordinary limited cash on hand.

What we want to see here in the East, where the idea of beef-raising ought to go up in a balloon, is to get the people, *i. e.*, some people, to appreciate a herd of Jersey cows for dairy purposes.

A short time ago, when you told the farmers that "Princess 2d" made over forty-six pounds of butter in one week, they expressed themselves forcibly to the effect that the statement was a lie, but now they respond by saying, "That was pretty good," while they themselves probably never had a cow upon their premises that would make over ten pounds of butter in a week, even had they turned her loose to a grain bin, to say nothing of the straw stack. Such is the way many people have of getting down stairs without tumbling or compromising their judgment.

There are, probably, in the whole United States, sixteen thousand milking Jersey cows and heifers. Many breeders who own fine herds of Jersey cows do not wish to test them, but manage them as any farmer treats his dairy cows. Many of them have made, on grass alone, fourteen pounds or more butter in seven days, and there are a thousand with reported tests of fourteen pounds or more in a week; but it is the yearly test that the farmer should be interested in, on common dairy rations and ordinary care.

Major Alvord, manager of the Houghton farm, reports that fifteen cows including old cows and heifers, yielded eighty-nine thousand six hundred and sixty-three pounds three ounces of milk, or a yearly average of five thousand eight hundred and forty-four pounds three ounces, which milk produced an average for each cow throughout the year of three hundred and seventy-seven pounds of butter, which, at the low estimate for Jersey butter of thirty-five cents per pound, would yield to each cow and heifer one hundred and thirty-one dollars and ninety-five cents, while her calf, if a heifer, would bring at least another hundred dollars, and if a bull, and not too high toned, from thirty to forty dollars.

This would be the ordinary profit on an investment of two hundred or three hundred dollars for a Jersey cow. I am estimating the calves at four weeks old, and giving the lowest possible price upon the butter, as well as the calves.

"Princess 2d's" bull calf recently sold for three thousand dollars at public auction, but we are not asking farmers to invest four thousand eight hundred dollars, from which to raise fancy-priced bull calves. "Oxford Kate" has a record of thirty-nine pounds seven ounces in seven days, and sold at the same sale for three thousand two hundred and fifty dollars. We do not plead their cause, for they seem to be short-lived after performing their wonderful gymnastic feats; but, with ordinary feed, a Jersey cow will respond to the owner with satisfaction, not only in yield, but in years, as there are many good ones, eighteen or twenty years old, doing their whole duty to-day.

Well-bred Jersey cows can be bought at the present time for from two to three hundred dollars that are just as liable, under proper tests, to make from twenty to thirty pounds in seven days as any that ever underwent such tests. We are having such cases reported by reliable authority every week, and these instances frequently occur outside of the fashionable strains. While I would examine pedigree, I would go more upon the make-up of the animal herself. As this testing business is a new thing, those who have the strain and have gained the glory are undergoing the most testing; but it is a matter of fact, and easy of proof, that, on ordinarily decent treatment, the Jersey cow will average more than a pound of butter a day throughout the year.

Why thrifty farmers, who have money deposited in savings banks at four per cent. interest and a risk of exporting another cashier across the Canadian lines, will sit down with nonchalance and figure up the profits of a two-year-old steer thus, surprises me: Twenty dollars for a yearling in the spring; twenty-six weeks' pasturage at fifteen cents a week, three dollars and ninety cents; ton of hay, eight dollars; five bushels of corn, five dollars; aggregate expense of two-year-old ready for the butcher, thirty-three dollars and forty cents. The farmer claims he sells him for forty-two dollars, which gives a profit of eight dollars and sixty cents, if the labor of attention and the steer's bedding are considered compensated for by the manure produced, by which the farmer maintains the fertility of his land. This latter result, however, will be as effectually accomplished by the butter-cow as by the steer, which consumes five bushels of grain during the winter, and is to be reduced to beef in the spring, to be loaded upon the city show-wagons and peddled through the streets to supply the demand for rich cuts. Our local butchers to-day are buying these same yearlings for from thirteen dollars to eighteen dollars, and they cost as much to produce, with the exception of the original investment, as my yearling Jerseys, and these heifers are worth more than one hundred dollars in any market, and bulls from thirty dollars to forty dollars, according to the market. I would not advise a great many farmers to launch out bravely in the Jersey business, as they might lose their money, but it seems possible that a few spirits in every community might indulge profitably in the enterprise.

Let a few in a neighborhood get what "full-bloods" they can afford, and commence breeding grades from a bull in common, enabling them to combine in their shipments of butter, and how long would it be necessary to legislate against oleomargarine? And how long should we hear of fifteen or twenty cent butter, if every neighborhood would go to work to establish a *standard of butter?*

IMPROVE YOUR DAIRY—WHEN, HOW, AND WHY.

By Asa R. Sturtevant, *Springboro, Pa.*

As to the first question, when? we would say, at once. In no case will the axiom, "time lost can never be regained," prove more true than in the improvement of dairy stock. A good cow does not spring up in one night like a mushroom. It takes years of hard study and patient waiting to combine the qualifications necessary for a perfect cow. Hence, the necessity of beginning at once. I have milked from fifteen to thirty cows most of the time for twenty years. For the first ten years, I milked "Old Brin" and her companions, morning and night, year after year, looking but little to the wants of the cow—what she must have in order to make her a success as a dairy cow and a profit to myself—until, at length, this question suggested itself to my mind: "If this is to be my business, if I am to look to the cow to pay my taxes and store bills, and to clothe and educate my children, how shall I make her more profitable, or what means are within my reach for making two pails of milk flow where one has flowed before?" And I then began my work of trying to improve my dairy, and years of experience have taught me that there are many ways by which a grand improvement may be made, some of which I will mention, hoping, as I do so, to mention at least some one thing that may prove a lasting benefit to some dairyman.

1. By weeding. This should be done at once. We all know how two plants, grown where there is only room for one, will suffer; how much we lose if we allow more than four good stalks to grow in a hill of corn, and much more if the ground is occupied by useless weeds. It is just so in the dairy. Weed them out, sell them off, every one that does not pay a profit—yes, and a good profit. For no cause whatever keep a cow that, after a fair test, proves a failure; better, by far, sell her for less than you think she is worth than waste your time and feed upon her. Close them out until your poorest are better than your neighbor's best, and until you can do well by each animal you have left. Then they will do well by you. I think much depends on thorough, thoughtful weeding as a means by which to improve our dairies. Now, after we have a uniform lot of good cows, with short legs, long, heavy bodies, slim necks and tails, and fine heads, with bag like a wash-tub, (small tub,) barrel large and round, we have a lot of machines that we can do a dairy business with at a profit, and with satisfaction to ourselves. I give satisfaction a goodly amount of credit; a certain amount of it is worth just so much money to me.

Next after weeding comes breeding. This is a study. We think a man who builds a house should first learn his trade, or the manufacturer of any machine or implement must be a skilled workman, and know just how to use his material, to put it together to produce the best results. "But any one can breed a cow," I hear some one say. Yes, that is true, but not to obtain the best results. In no other business does it require more brains, better judgment, or more hard study, cutting and fitting, if you please, than to be able to breed a perfect animal—an animal suited to a special purpose, or to improve your dairy. Breeding to a purpose was taught by Jacob while he had charge of Laban's herd. He was to have as his pay all the ringed, streaked, and speckled cattle. He had an object in view, and he went to work with a fixed purpose. He took the poles and when the strongest, best cattle conceived, he placed them where they came to drink. That was his plan for weeding the flock, and the result was he had all the best of the flock spotted (Holsteins, I suppose). Some of the causes that have hindered the improvement of dairy cows are simply ridiculous. I will mention only a few. The distance required to go in order to reach a suitable sire is a bugbear in the eyes of some men. They had rather breed to a dung-hill, and get a seventy-five-cent calf, than to spend a day or two and breed to a bull of individual merit, and get a calf worth seventy-five dollars. Their time is too precious to drive a cow off, but, at the same time, you can hire the same man to work for you at a dollar a day, and he is glad of the chance. (Oh, consistency, thou art a jewel!) There are a few grand exceptions to this class. Thanks to the pluck of one of my neighbors—and

I will mention his name—T. B. Graham—who led a cow sixty miles and back to breed her in such a way as to improve his dairy, and it will be well for me to state that he was a Durham man. Had he been a Holstein man, he might have bred her to my bull, and saved one hundred and twelve or fifteen miles' travel.

Another hindrance to successful breeding is the slight difference in the price of service of a good and poor stock animal. Fifty cents is the outside figure for some men, no matter how fine an animal you may have, or what you may have paid, or how much pains you may have taken to get him. Now, do not be so negligent; do not be so foolishly stingy. Use the best bull within your reach, almost regardless of price or trouble. There is always a profit in a first-class calf of any breed.

Next after weeding and breeding comes the no less important matter of feeding. If we see the weight of a heavy hog published we take it for granted he has been fed something. If we read an account of a great number of bushels of grain having been threshed by a machine, we know that the machine has been fed. But, if you publish the amount of milk that a cow gives, people look wise, or unwise, and say at once, "Oh, yes; but you *feed* her." How strange! What is she? Nothing more or less than a machine working up what is placed in her reach and paying over in proportion. I refused to board a cow for one of my neighbors just on the ground that she was too lazy to eat much. When the other cows would be in the field, she would stand in the shade doing nothing. Some of you may scorn the idea, but it is a fact notwithstanding that some cows are too lazy to gather much food, and these must be weeded out in order to improve our dairies. Regularity in feeding is very essential to obtain the best results. A cow soon learns the feeding hour, and in case you fail, you incur a loss at the pail. As regards the different kinds of feed, some prefer one kind and others something else. I think that a variety of food is desirable for a dairy cow. She likes a change, and it costs but little more to have different kinds of grasses, with rye, oats, etc., in the field where they feed, than to have merely one kind, and they will change from one to the other with relish. In winter, sugar beets are very good. I have figures to show that they will increase the flow of milk quite an amount. Bran and oats are considered good feed, but I do not use much corn. Something from nothing leaves nothing; but something from a well-arranged pasture-field, or a good pailfull of wholesome feed, leaves a pail brimming full of pure milk.

The next thing we will look after is how to get the milk; we will start with sending the most careful hand on the farm after the cows. No rattle-headed boy can in any way improve a dairy, nor is it necessary for a cow to haul a dog half the way from the pasture to the barn by her tail in order to improve the quantity or quality of her milk. She should be driven quietly home with careful hands. I am a firm believer in a time for all things—a time to sing, a time to talk, and a time to be quiet and attend to business, and the last is milking time. No one but a man who knows the value of a pail of milk and is willing to put forth every effort to obtain it should be allowed in the milking stable. Have a stated time to milk, and milk on time. Punctuality is a greater source of profit for what it costs than most men think, if they have never made it a test. What would you think of a preacher that would be a half an hour late at his appointment, or a banker who would fail to open his bank on time? And in neither case is it more important to be on time than for the dairymen. The faithful cow, true to her cause at all times, becomes uneasy, and a loss is incurred when the aim is, or should be, to have a gain. It has been a question in my mind for some time, how many times a cow should be milked for profit in twenty-four hours; and I am free to say, and without fear of successful contradiction, that it is practicable to milk every eight hours—at five, A. M., and one and nine, P. M. These are not very unreasonable hours for the work, and it will pay a profit, and the man who wishes most to improve his dairy must adopt this as one of the essential means. I had one of my cows milked every six hours (four times a day) for thirty days last summer, with but little gain over the eight-hour plan; and it is much harder on the men and proved an over-dose of a good thing. What I say I do not say by guess. I weigh my milk, and can give the figures in these tests if required. A good dairy farm is a school where many may be taught if they will. Give your cows a little bone-dust or ground bone once in a while—they need it. I have known of cases where the bone in cows became chalky, and the leg would break on account of a lack of this substance. You have all seen cows pick up bones in the field, and are lucky if you never had one choked to death in that way. Then give it to them in a form that will not harm them. Salt should at all times be in reach of your cows.

One more very important matter is that we should always provide ourselves with extra feed to carry our cows over the dry weather in August. Have a piece of sowed corn, or I have had grand success with oats, which are usually cheap at that season and can be fed at a profit. It keeps up the flow of milk until the later rains come on, while, if allowed to drop off, it cannot by any amount of any kind of feed be brought back. Therefore, as a great means of improvement, keep up the flow as long as you think it will do, allowing only proper time for rest before dropping the next calf, which should be about sixty days. Having mentioned a few of the many ways, I will try and give my reasons why we should improve our dairies.

First of all, the age in which we live demands it. I am a young man, and well I remember when the horse that made his mile in 2.40 was very fast; now he would be considered too slow for a country preacher; skill in breeding and management has made the change. We used to be well pleased if in months we could communicate with our friends at a distance; now we step up to a box with a wire attached and talk to almost any place as though seated side by side, and so on. We know the cause. It is that disposition to improve, to make the best use of the means God has placed in our hands to promote our happiness. Now are we, as dairymen, representing as we do one of the greatest and grandest industries of our country, less capable of improving than the rest of mankind? I say, most emphatically, no.

One more reason why—and this should stimulate the most indifferent to action—the money is in it. What breed of cattle are capable of making the greatest improvement? A dairyman's disposition must be consulted in this matter. If he is proud and will not milk a goat, he should get an Alderney. If he is lazy and won't milk at all, let him keep cows that only give enough to raise their calves, like the Durham. But if he is a thrifty, thorough-going man, anxious to secure the best results as a reward for his labor, he should have the Holsteins. I know of no greater means of improvement to a dairy that is not already perfect than to fill in with this breed of cattle, as they are of good size, are good feeders, and make more butter and cheese than any other breed, and, in short, are the best general-purpose cows known. Get pure-bred cows, if you can, of course, but if you cannot get them, take the next best thing—a high-grade.

Now, I will sift this article and get all the good out of it, so in case a man has not time to read it all he may have the substance of it. When?

At once—time lost can never be regained. How? By careful weeding, breeding, and feeding. ' Why? Because it will pay. Any questions asked or comments made on the above will be cheerfully answered.

HOME-DAIRY BUTTER-MAKING.

By MRS. CARRIE DRAKE, *Little Cooley, Pa.*

To be a good butter-maker, you must first know what good butter tastes like. Many have had their natural taste perverted by the continual use of a poor article; not only city people, but farmers have had their sense of taste damaged in this way.

The conditions that sometimes beget common-sense ideas of butter-making are a little pride, a little laziness, or lack of strength and brains.

How many there are that milk from one to a half dozen cows, have good cellars, yet have to churn from one to two hours to get butter, when it should come in one half hour, or less. If churning two hours with a dash churn won't brighten one's ideas on butter-bringing, perhaps there is no use trying to do it by writing.

To be successful in butter-making, one must have a proper place to put the milk; this one half of our butter-making women will declare they have not. Many unfit places can be improved by a little philosophy, cleanliness, and common sense.

There are, every summer, a few warm days followed by sultry nights when it is difficult to make good butter with ordinary conveniences. At such times it is a good plan to cool the milk before straining; if no other way, set a pail of milk in a tub of fresh pumped water; stirring the milk well hastens the cooling. One of the main causes of butter being loth to come is that the milk stands too long before it is skimmed, or the cream waits too long after it is skimmed before it is churned.

Many tidy, stingy women make butter this way. There cannot be so much got from cream that has stood twenty-four hours too long as from that which is just right.

There is a time after milk sours before it thickens. Then is the time to skim, or, rather, to turn off the cream. There is no need of a skimmer; just run a knife around the pan, then let the cream slip off in a jar or stone churn. This can be done without scarcely any milk with it. By this process you diminish the time spent in skimming one half.

I prefer the dash stone churn for its simplicity. I do not like to clean the works of an engine every time I churn. Milk is as susceptible as rheumatism to atmospheric changes. If the day is sultry, and your milk sours in twelve hours, skim it, and churn oftener until the weather has changed.

Don't spill milk in your cellar if it has a clay bottom and no floor. Don't let the cream wait till it smells like limberger cheese before churning, for when cream has turned to whey it takes time, patience, and back-bone to bring it to butter, unless you have a boy or a docile husband to churn for you. If so, you won't need to bother about condition or temperature, but just let them churn. Then they will know what women (who lack sense) have to endure. Don't churn two hours when a half pint of warm water will save three quarters of the time. Learn first of all what the right temperature should be for butter to come quick and right. This can be done by touching the cream with the tip of the finger; the cream should feel cool but not chilly. The same degree of coolness will seem to feel colder on a hot day than on a cool one. Butter-makers should give this item their attention, for it is wit that will stand by them and help them. If they cannot learn the right temperature, they can get a thermometer. If a cream-jar sets on a cellar floor, and the churning is done in the morning, butter will usually come cool enough. I would not churn in the cellar, although there may be a few times in the season when it will be necessary.

If, when packing butter, one or two churnings by accident come too warm, put it in another jar for present use. Another thing, in packing, butter should not set around; make all possible haste and get it away from the air.

What a dose city people must get when they buy butter gathered and summered at country stores! No wonder they prefer oleomargarine. It is said that much of the poorest butter is used by bakers and soap-makers. People that can make correct butter should make it and keep it for winter, until the "present-use" butter is consumed. They would then get fair play, while there would be more in market, and the price would not be so great for consumers. I hear that many city people, owing to odorous surroundings and the habitual use of perfumed soaps, salts, etc., have well nigh lost the sense of smelling, which will, to them, be a merciful process of evolution, if they have to eat store-butter.

WINTER DAIRYING IN THE WEST.

By C. L. GABRIELSON.

We have our cows come in in September rather than in May. The pastures are recovering from the mid-summer drougth, the meadows are then in full bloom, the price of butter has passed the low ebb of July and is now being carried to the high tide values of January and February. There is also more time to fuss with both cow and calf, and this attention is well repaid in liberal yield of the cow and satisfactory growth of the calf. We have found that a calf born in the fall will, with proper care, be further advanced at a year old than one born in the spring.

It will be understood, that in order to secure the greatest benefit from the cow and her produce during the fall and winter, sufficient shelter is of a first importance, but it is not necessary that costly barns be built to secure our stock from the rigor of a northern climate. When the cow is about to calve she is separated from the herd in winter by giving her a well-littered pen in the stable, and in fine weather she is usually put in a lot near the house. Ordinarily, no assistance is needed. Where the owner or attendant has the confidence of the stock, a cow appears pleased to have him present, but if she shows her dislike, see to it that all is well and leave her. After the calf is born, while the cow is fondling it, draw all the milk from her now distended udder and let her drink it. The effect of this first milk is laxative, helping the cow to clean. By milking the cow, she will be relieved of this burden, and the youngster will find enough for its wants. Give the cow a warm mess of bran and leave her alone with the calf. We leave the calf with its mother till the milk is clean, taking care to empty her bag night and morning. After this, the cow is partly milked until the calf is a week old, when she takes her place among the others, giving her a stanchion facing the calve's pen. Treated in this way, the separation is so gradual that the cow does not worry over it.

The calf is fed with new milk night and morning. Sweet skimmed milk is warmed for the little fellow at noon. Oil-meal is mixed with the milk in small quantities at first; the amount is slowly increased as the shifts are made from new to skimmed milk, taking care to make all these changes without haste. Great watchfulness is needed during the early life of the calf not to overfeed. Next to this, giving the calf cold milk is a source of annoyance which it resents, to the damage of its owner. The chill may be taken from the milk by mixing with it boiling oil-meal gruel. This way of warming the milk will often relieve the kitchen of a nuisance. When the calf begins to chew its cud, oats, either ground or whole, are placed within its reach. Hay is also provided. From this time forward, only abundant and judicious feeding is needed to produce an animal both pleasing and profitable.

A successful feeder of animals is not one who throws the feed before them or sets down the pail of milk, indifferent as to whether they eat or drink. A skillful feeder watches the peculiarities of each individual, and sees to it that the tyrants do not rob the weaker ones. We have learned that stock thrive best when they often feel the weight of the master's hand in kindness. Cows that calve in the fall will, if previously fed as they ought to have been, be in good order to withstand this trial, but are likely to lose flesh if not generously cared for. Timely attention now will keep them hearty and well prepared to do good service in their winter quarters.

With the appearance of frosty nights, the cow enjoys the comforts of a stable, and with it begins hand feeding. A cow is not unlike other folks, in that she prefers a variety of food. This is well shown by the fact that, no matter how plenty the green feed, she relishes a bite of hay.

On the farm, as winter food, good clover, timothy, and other hay is the basis, with such additions of richer food as the animal's requirements indicate. If the cow is merely considered a machine to convert raw material into a concentrated product, the amount of grain that may be fed is only measured by her capacity to digest and assimilate. If the cow is to be useful for a breeder for a number of years, to feed on a high-pressure system is not for the interest of her race.

In winter, great attention should be paid to the watering of cows giving milk. They are extremely sensitive to changes of temperature. On a cold day a well-fed steer will frolic about the yard, having a good time generally, while the cow often goes from the water-trough to the stable door, begging for admission.

I find that after steady cold weather has set in, cows prefer to remain in the barn most of the day, and as it pleases them they are permitted to do so. A cow that is giving milk does not need a great deal of exercise, especially when the mercury indicates zero weather. In a sheltered yard, cattle do enjoy a sun bath, but to leave them out in cold or stormy weather is cruel.

CREAM-GATHERING IN THE WEST.

By J. B. Thompson, *La Plata, Mo.*

It is not my purpose to speak of any of the excellencies or advantages of the system of gathering cream that is the foundation of what is termed coöperative dairying. That the system, even in its imperfect state, is an excellent one and has succeeded in laying broad and deep the foundation for profitable and successful dairying in the West, all will admit, but that it has serious and seemingly insurmountable defects, the owners of Western creameries are more than ready to admit. My purpose is to point out these objections, with the hope that the assembled wisdom of this convention may overcome them. I will state the defects *seriatim* as I view them.

First. When the cream wagon runs every day, and the driver does the skimming, he finds the cream on the milk at different stages, the first at a few hours after milking, when the cream has not had sufficient time to separate, which entails a loss to the farmer. If the milk is held over for skimming until the following day, it is injured, (unless the farmer is well prepared for keeping it,) and this works a loss to the factory. The system of skimming by drivers is not the nicest thing imaginable—with the dust falling from their clothes, or dirty water dripping from their hats on rainy days, and the aroma of the livery stable all about them; drivers who have long routes do hasty skimmings, so that I have known heavy shortages to occur in mid-summer.

Second. Farmers soon learn ways that are dark and tricks that are not vain, and study out many inventions by which cream is made to show up on the gauge that will show down in the butter. The average cream-gatherer is not a saint, and notwithstanding he is in the pay of the factory, he soon gets into a kind of close corporation with the patron, and the vegetables and fruits, and an occasional leg of mutton in season, that he picks up on his pilgrimage, enable him to convert a one eighth into a one fourth on the gauge of the can. This is not a *fair*-lamb proceeding, but these little things in the course of a year will show a shortage that cannot be otherwise accounted for. A creamery that will show a gratifying over-run the first summer of its operations will experience a shortage on the second summer. This state of affairs is intensified as cold weather approaches. The price of cream per gauge must be greatly increased, while the quality is not appreciated, and the quantity on the ratio between a gauge of cream and a pound of butter is something entirely beyond the control of the proprietor of the factory. In winter, I have known the shortage to range all the way from five to fifty per cent. It is absolutely so uncertain that no calculation as to profit and loss can be successfully made. There is likely more difference in the quality of butter-producing properties of different cream than even creamery men are aware of, especially in winter. At this time of the year, when cows are carrying their calves, they seem to reserve the richest of the butter-producing principle for the calf. The present system of buying and gathering cream makes no distinction between rich cream and poor cream, which works an injustice to the farmer who is careful and painstaking. His good cream is to go in to make up the loss occasioned by the profligate and indifferent. The business does not, for this reason, make the progress it should make. There is about the same relative difference in cream as there is in farmers' butter.

Just how to successfully overcome these difficulties is the question I desire to bring before this body. I know of no business that is less under the control of the man who owns and runs it—the man who has to stand the loss and foot the bills—than that of the owner of the creamery on the gathered-cream system. He can neither control quality, quantity, or temperature of the cream. His patrons and his drivers know as much about his business as he knows himself. What we need is an invention of some kind that will readily, and without too much labor and expense, determine the actual butter-value of the cream, as the merchant's scales will determine the quantity of butter the farmer brings him. We want some simple method of determining this, so that the ordinary farmer can readily understand and thoroughly comprehend it.

When this is done, the creamery man will be master of the situation.

He has to do justice to that farmer who is diligent and painstaking, and who furnishes an excellent article of cream. Not only this—he has control of his drivers. He can, by this plan, pay so much per gauge for gathering cream, and the driver will take a lively interest in his business, and will work it up, instead of, as heretofore, being content to drive from sun to sun for his two dollars per day, to say nothing of the huckstering that has heretofore been going on between him and the patron, to the great loss of the factory.

In conclusion, permit me to say that, in my opinion, we have scarcely reached the threshold of the grand success that ultimately awaits us. I know we have made great improvements over old methods, yet I am satisfied that the inventive genius of our country has scarcely begun to exercise itself in this behalf, so that there is scarcely an implement or machine used in the dairy or factory but what will be greatly improved, until new inventions in machinery and appliances will perfect our business, and so increase the excellence of product that we can laugh to scorn the efforts of the bogus butter-maker to compete with us. No doubt but there is room for great improvement in the quality of creamery butter, and those who seek to excel in quality rather than in dividends for profits will, in the end, be the victors, and prove the survival of the fittest.

PLEURO-PNEUMONIA.

By JAMES W. SALLADE, M. D., *V. S.*

This subject is one of paramount importance to the agriculturist and breeder, but not to them alone, for it is of vital importance to us as a nation. I will briefly endeavor to describe *pleuro-pneumonia contagiosa*, giving my reasons why the National Government should assume control in the premises. *Pleuro-pneumonia contagiosa* is a disease of a highly contagious character, febrile in nature, peculiar to horned cattle, due to a specific contagium, which gains access to the system by the lungs, acts principally on them, but affects the system in general; after an incubative period of from two to three weeks to as many months, it induces complications in the form of extensive exudations within the lung-substance and upon the surface of the pleura, finally resulting in consolidation of some portion of the lungs, occlusion of the tubes, embolism of the vessels, and generally adhesions of the pleural surfaces.

In some cases, there is extensive and rapid destruction of lung tissue, with death from suffocation; but most commonly the disease is of a lingering character. Symptoms of great prostration manifest themselves, with blood-poisoning from absorption of the degraded pulmonary exudate, and death from marasmus and assnoea follows. It is supposed to have originated in Central Asia, and has been conveyed to all parts of Europe, Africa, America, Australia, and New Zealand.

It is a disease that has been known upwards of two hundred years in Russia. During the present century, it has gradually made its way from the East to the West. It was noticed in Prussia in 1802. Germany, Switzerland, Holland, France, and England suffered immensely; from England it was carried to Australia, and here we have an example to prove that the first manifestation of illness is not at all to be depended upon as a guide to its true commencement, for in this instance the carriers of the contagion—bulls for breeding purposes—were three months on the voyage, the disease only breaking out after they were landed. Here in America the disease is confined to six of the Atlantic States, and here we have it only in the eastern counties of the States infected, or east of the Allegheny mountains.

The reason that we do not have it west of the Allegheny mountains lies in the fact that the cattle traffic is almost entirely from west to east, or in direct opposition to the course and progress of the disease. Once it gains a foothold on our Western prairies and cattle ranches, we shall never hear the end of it. The disease occurs in two forms—acute and sub-acute. It mostly occurs in the sub-acute form, is a very serious disease, and has various stages. As I have already intimated, it has an incubatory period, and perhaps the first thing noticed is a slight cough. There may be rigors or shivering, but these are frequently so slight as not to be noticed. After this the system becomes impaired, and the cough is of a hacking, husky nature. If the rectal temperature were now taken, it would show an increase of several degrees Fahrenheit, running up to one hundred and three and one hundred and four degrees even before anything is noticed amiss with the animal. The affected animal estranges itself from the rest of the herd. If a milch cow, the secretion of milk becomes impaired. The cough now gradually increases and the animal may be thought to suffer only from a cold, but while the external manifestations are apparently so insignificant, the changes in the inner animal economy—in the lungs—are well marked and persistent in their character. During this, as well as during subsequent stages, the disease may be communicated from one animal to another. The disease now gradually increases, the fever is more decided, the cough more persistent, respiration more labored and quickened, the animal generally persists in standing, grunts at each respiration, the breath is fœtid, the nostrils dilated, there is a discharge from the nose and eyes, the pulse ranges from seventy to ninety degrees, at first hard and full, and then hardly perceptible. Pressure upon the intercostal muscles causes great pain. The animal stands with nose protruded, muzzle dry and parched, painful and haggard physiognomy. The animal may have slight diarrhœa, which is followed by obstinate constipation. The animal grits the teeth, auscultation now reveals variable dullness and frictious sounds due to pleural surfaces rubbing together, mucous membranes pale, eyes glassy, and death follows.

Other diseases, both contagious and non-contagious, are quite frequently mistaken for pleuro-pueumonia. For instance, catarrh, bronchitis, and other sporadic diseases as well as tuberculosis, anthax, Texas fever, ergotism, and other contagious and infectious diseases. I cannot stop to point out to you the very many differences between all of these diseases and *pleuro-pueumonia contagiosa.* Time will not permit it. Neither do I propose to make cow doctors out of all of you. It is sufficient for you to know enough of the most prominent symptoms to arouse your attention and to employ a qualified veterinarian whenever you have sick stock. I will now revert to the subject and tell you that there is no known remedy for the cure of this dreadful disease.

No attempt at treatment should be made. Some claim to have cured cases of it, but I do not believe it. I believe that what they treated for *pleuro-pueumonia contagiosa* must have been quite entirely different diseases and that they erred in their diagnosis. The disease was first known in America in 1843. Since then we were never free from it. England has lost severely by it and is now trying to free herself from it. She is determined to extinguish it from her own domains, now that she has spread it; the consequence is that Mr. John Bull restricts our cattle trade with England as long as we foster *pleuro pueumonia contagiosa*, which, as an exotic, should never have gained a foot-hold on our shores. The only available remedy is the *stamping-out system*, and it cannot be successfully practiced unless by united effort. This is a question of national importance and should receive national attention.

It is the only efficient way of getting rid of this mighty foe. It will not do for the States to act independently on such a question, for one State might enforce restrictions and another adjoining State remain indifferent. Simultaneous action by the States could hardly be expected. The law is to be rigid and must apply to all sections of the country with equal severity. The stamping-out system comprises all the essential means to free our herds from the disease. It means not only the killing off of all affected animals, but provides also for a safe and practical disposition of the dead carcass, strict quarantine of all doubtful cases, thorough disinfection of all affected places. Cow sheds, etc., where sick cattle were kept, should first be fumigated by burning sulphur and then thoroughly whitewashed, roof, floor, walls, every nook and crevice, with lime-wash containing carbolic acid in proportion of one pint crude to every bucketfull.

The animals actually diseased should be killed, those suffering from the disease in the incubative stage—that is to say, those in which the disease can only be detected by the thermometer—should also be slaughtered, and all the unaffected cattle which are, or have been, in contact with diseased ones should be inoculated. In this way the loss will be reduced to its minimum, and the country will finally be freed from its occurrence. I hold that the loss should be borne entirely by the general Government, excepting where there is a suppression made of the existence of the disease by the owner of stock, when I would have him to carry the full load. The Government must have competent inspectors who are empowered to carry out the law. You might ask, Why should the unaffected States be required to contribute their share to defray the expenses? I answer, because they are in imminent danger; the virulent disease knows and respects no boundary lines, and because a stitch in time saves nine. The expenses, if borne by the general Government, are comparatively insignificant and the work will then, and then alone, be effectual.

SOUR AS WELL AS SKIM CHEESE GETS LEFT.

By Professor L. B. ARNOLD.

New York State cheese-makers are charged by English consumers, and by English and American dealers, with more skimming than they really do. The charge is based on the apparent quality of the cheese, which often bears a striking resemblance to skims. The cheese is, indeed, often faulty, but the fault lies, not so much in skimming as in the mode of making, and is occasioned, in the first place, by the use of sour and stale whey in the preparation of the rennet, and in the second place, from allowing the curd to remain in the whey till the latter becomes distinctly sour, and then hurrying the curd into press too soon.

The effect of this treatment is to make a hard, dry, sour cheese, one which, from being slow to cure, remains a long time curdy and insoluble, giving it the *appearance*, and I may add, the *quality* of veritable skims, though, in truth, as full of fat as the Canadian cheese, which is outselling it, and which is much superior, because it has not been subjected to the baleful influence of so much acid.

Previous to 1879, Canadian cheese was as poor as, and poorer than, New York cheese, and from the same cause. It was not till I began, in that year, giving instructions there, and insisted on having sweet and sound rennet, drawing the whey sweet, and giving the warm curd a long airing before pressing, that Canadian cheese began to rise superior to the cheese on this side, and just in proportion as the practice has extended, has Canadian cheese been coming to the front, till now it is taking the lead in English markets.

Cheese-dealers in Canada have very generally and wisely favored this change, while the dealers on this side, and most of the dairy press and writers, have as generally opposed it, and hence the contrast between Canadian and New York cheese—the one rich, mellow, and melting on the tongue; the other hard and unyielding, dry, mealy in texture, and so insipid, insoluble, and indigestible as to lead them to be classed as skims.

Nevertheless, much of this rejected cheese contains the usual quantity of fat due to full cream-cheese, as shown by analysis. It was a surprise to Dr. Voelckler, when analyzing some of the supposed New York skims, to find that they contained more fat than a rich English cheddar cheese. Under the instructions of Professor J. B. Harris, the Scotch cheese-makers are rapidly and effectually getting their eyes open to the use of sour whey in cheese-making, as is shown by the numerous premiums taken by the cheese made under his directions, which are precisely the same as those above indicated, which have brought Canadian cheese to the front.

The cheese-makers and dealers of New York, and in some of the other States, are beginning to rub their eyes, and probably some time in the future will get them open wide enough to take an appreciative glance at the situation, when they will be able to comprehend the reason why they "got left."

SWEDISH METHOD OF BUTTER-MAKING.

By a Professor of Agriculture in a Swedish College.

Cleanliness.

One absolute condition of obtaining good butter is that the greatest care be taken to preserve cleanliness, both in the milking and during the whole operation with the milk and butter. This also applies to the vessels and utensils that are used in the dairy.

The Fodder.

The fodder that is given the animal must be fresh and good, if rapeseed-cakes [*rapskakor*] (at the most, one and a half pounds per day to each animal), bran or oats, bolted; these tend to increase the flavor and fine quality of winter butter.

Quality of the Milk.

The milk that is to be used in the dairy must not be mixed with that from sick cows or dry cows, and the milk should not be used in the dairy until the sixth or seventh day after calving.

The Milking.

At the milking, care must be taken that the udder is well wiped with a dry towel, and that the milkers have perfectly clean hands; also, that these do not dip in or come into any contact with the milk. Dunging must not be undertaken during the milking.

Treating Milk Before Skimming.

The milk must be removed from the place as soon as possible, and in the summer be exposed as little as possible to the heat of the sun. Directly after the milking it should be strained through a coarse linen cloth, or, still better, a fine wire sieve. When the milk has come into the dairy. it is best if it can be separated immediately, for the sooner this is done the better, and the butter will keep longer. If it is not possible to do this, and should the milk, from some cause or other, have to stand for some time before the separation occurs, the place in which the milk is kept ought to be well ventilated, so that good and fresh as well as dry air prevails there. This also holds good throughout the dairy. The ventilation is to be secured by means of large ventilators, both at the floor and roof. During the warm season of the year, if the milk is kept twelve hours or more before the separation can take place, it ought to be cooled in water or ice to thirty-two degrees or thirteen degrees Fahrenheit. If the temperature of the milk has, from some cause or other, gone down below seventy-seven degrees, the milk, directly before the separation. should be heated to seventy-seven degrees Fahrenheit. Immediately after the separation the cream should be cooled, in ice by preference. The more thoroughly the cream is cooled, the finer will be the butter and the longer it will keep.

Souring the Cream.

Eighteen or twenty hours before the churning, the cream must be heated to sixty degrees or seventy degrees. In the winter, higher; in the summer, lower; poured into the cream vessel, and set with two to five per cent. butter-milk or sour cream from a previous churning. One regulates the degree of temperature and the sour ingredients, so that the cream directly before the churning has its right sourness. In order, during the whole souring-time, to keep the temperature somewhat equal in the cream-vessel, one surrounds it in the winter with straw, or the like. for the temperature in the cream-barrel must never sink below the churning temperature, and neither is it well to heat the cream above seventy-four degrees. For the heating of the cream one puts it in tin pans, in water of one hundred and five degrees—not higher—and stirs it constantly until the cream has reached the right temperature for souring. This can also be accomplished with a so-called cream-warmer of tin, which, filled with water of one hundred and five degrees to one hundred and twenty degrees, is moved around in the cream until it attains the proper temperature.

The greatest attention ought to be given to the cleaning of the cream-barrel, and it ought always, after every souring, to be extremely well scalded with boiling water or steam, as well as to be well aired and dry before use, otherwise the butter will easily get a tang. It is, therefore, most suitable for one to have two cream-kegs, and use each every other day. In order to keep the curds constantly fresh, one prepares them at the farthest once or twice a month, *and, for the rest, immediately, if any remark has been made against the butter*, for with the old curds, the defect is transferred from one churning to the other. New curds are prepared in the following way: Twenty pounds fresh milk are heated to ninety-five degrees Fahrenheit, and kept in a stone jug, which is placed in a box, or the like, filled with hay and covered with a lid, so that the temperature is maintained. After four hours, when the milk is generally already sour, it is well stirred, so that all the cream that has formed is mixed in, after which one allows it to stand twelve or fourteen hours longer, during which one now and then stirs the milk vigorously, so that no thick lumps are formed; then the curds are ready for use. Should they not be used immediately, they must be kept in ice-water. This quantity of curds is sufficient for the souring of four hundred or six hundred pounds of cream. During the first three hours of the souring, one stirs the cream a few times. But, afterwards, it must stand untouched until a half hour before the churning, when it must be thoroughly stirred. Through this it obtains an extremely sour taste. It is better to have it rather too strong than too weak, for otherwise the butter will acquire a flat, and, most frequently, a bitter taste.

Then the soured cream is cooled to fifty or sixty degrees higher in the winter, lower in the summer, and then strained in the churn, which has before been rinsed out with water of a corresponding temperature. The best churns are the so-called Holstein churns. The churns ought not to be filled more than half or two thirds full of cream. Before the churning begins, a suitable quantity of coloring matter is put in the churn, so that the butter gets a faint tinge of straw-color. One must take care, in pouring in, that the coloring matter does not come to the wood in the churn, as the color would then easily become uneven. The coloring matter must always be regulated by the quantity of milk from which the cream has been obtained, and a suitable coloring ingredient is two and five tenths to five grains for one hundred kilos of milk, that is, thirty-five to seventy grains per two hundred pounds, according to the season of the year and the demands of the market. Then it is churned with such speed that butter is obtained in from thirty to forty-five minutes, and this is regulated by the temperature and quick motion which yield butter soon, a low temperature and slow motion the contrary.

When the cream has turned, the churning is interrupted for a few seconds, and the cream that has dashed up on the lid and sides of the churn is rinsed down with water or skim-milk of the same temperature as that which prevails in the churn. Then it is churned more slowly, in order to get the small flakes or pellets of butter to collect, and now it is of great importance that the churning is stopped in the right time. If one breaks off too early, less is obtained, and if one churns too long, the butter becomes overdone. When the butter-milk separates itself, clear, from the pellets of butter, and these are scarcely the size of a pin-head and have a rough surface, it is time to stop.

The greatest care ought also to be devoted to the cleaning of the churn; it should be carefully rinsed every day with boiling water, and afterwards aired and well dried in the open air. Churns that are not perfectly dry often give the butter an old taste. If one can steam the churn once a week, this is particularly suitable.

The butter, when ready, is taken out of the churn with a hair-cloth sieve, washed in one or two waters, whereupon the butter-milk is pressed out through working over with the hands. Then the butter is weighed and mixed with two or three per cent. of good salt, the best Lunnenberger, which is kneaded in with the hands. In working over with the hands, the butter must never be rubbed, but only pressed. Then the butter must lie one or more hours, until it has got some firmness, then it is worked over in a kneading-machine, or on a kneading-board. In the summer, it is suitable to let the butter, before the last working over, lie in a so-called refrigerator, through which it obtains greater solidity. The refrigerator is made of beech wood, fourteen inches high, twenty inches wide, and sufficiently long to contain the butter desired. The butter is laid on a wooden trellis one fourth of an inch thick, two inches broad, that is placed across the bottom of the box, on cross pieces, on the long side, one inch from the bottom. The box is also covered with a lid, which consists of a box three or four inches high, of zinc, in which pieces of ice can be laid. In the ice-box, or refrigerator, the butter lies in cold air, and, through this, acquires still greater solidity.

Packing the Butter.

As soon as the butter is ready, it is put into firkins, in which it is packed down closely with a wooden pestle, so that no apertures are left in the butter. When the firkins are full, the surface is smoothed with a wooden spade, covered with oil-cloth, and strewn with a layer of fine salt, one half inch thick. The firkin is well rinsed with water before use, rubbed on the sides and bottom with salt, and kept as clean and white outside as possible. The whiter and more sweet the firkin is, the more desirable the butter in the market. Firkins of red beech are, on this account, unsuitable. On the lid of the firkin must be placed the trade-mark of the dairy.

SELECTING DAIRY COWS.

By GEORGE BLIGHT, *Philadelphia.*

In the neighborhood of large cities, no branch of agricultural pursuits can be carried on with more profit than a well-conducted dairy. The use of milk is so general that the supply seldom exceeds the demand.

The proper selection of the cows is the first consideration—to secure such as will yield fifteen quarts, and continue to milk up close to calving. Cows of this description will consume no more food than those of inferior quality.

Within the past two years, it has been my pleasure to visit many of the dairies of Pennsylvania, and to converse freely with the owners upon the character of their stock—in which I notice great improvement—and, also, in the manner of conducting their dairies. Being a strong advocate of the Guenon system of judging cows, I call their attention to it. In some cases, they are ignorant of his discoveries; others, again, know of him, but ridicule the idea that ovals on the bag or the mode in which the hair on the escutcheon runs, can indicate the value of the cow, but when the character of the cow is portrayed, her ability to yield as many quarts, and the time of its continuance are named, they are astonished, and want to know more about the system. In such dairies, there are many fine large cows in appearance, but, had the owner any knowledge of Mr. Guenon's theory, he would not have added them to his herd. The old mode of selecting cows was good in its day, but this is a progressive age, and why not adopt all the means in your power to secure your interests in this matter as in any other pursuit of life? One charm this system possesses—it does not require you to unlearn any of your pre-conceived views; it aids you in your judgment and increases your knowledge of the bovine race.

That the system is complicated and not easily understood, I readily admit; like all good things, it requires some trouble and attention to obtain a perfect understanding of all the minute points, but to one whose business it is to raise heifers for the dairy or to purchase cows in the market, it is worth all the time and attention required to secure this knowledge. To open his book and find there are no less than sixty-four different forms of escutcheons is enough to confound the learner, but let me assure him that a little perseverance and application of the system will soon open the road to its easy understanding. By constant study, a perfect knowledge of the case can be acquired, and the yield of her milk ascertained. Seldom have I failed to portray her true character, whether she be a milker or no.

I do not claim for this system the impossibility of error. In examining a herd of forty cows, two mistakes were made; these occurred in animals not easily classified, and therefore in going into the market to buy, I would not take those not possessing the marks. They are applicable to all breeds, and belong to the bovine race.

My fondness for cattle has made me familiar with all the different breeds which have been introduced into this country. The greatest number have been imported from the Channel Islands, and no lover of fine stock can fail to admire their beauty and gracefulness, but how well adapted they are to the general milk dairy is yet to be maintained. Now that the consumer recognizes the good quality of their milk and is willing to pay an additional price is greatly in their favor and a just tribute to their excellence.

The introduction of the Freisian or Dutch cattle will prove of great value to our milk dairies. They are of large size, healthy animals and great producers, showing that much care has been bestowed upon their breeding.

To those interested in supplying the market with butter, I strongly advocate the introduction of the blood of the Alderney cattle. I admire those from both islands. Let the farmer determine for himself. My predilections are in favor of those from the Island of Guernsey, because they are larger, stronger in their constitution, are equal in their producing powers, and, being of the same size with our native stock, are better adapted for crossing. The fine limbs of the Jersey bull will not give size and strength enough to the legs of his progeny to support the cow after she has reached her sixth or seventh year. My object in reading this article before you is to induce you to look into this subject and judge for yourselves whether Mr. Guenon has been deceived or not.

DOES IT PAY TO IMPROVE OUR STOCK?

By WILLIS P. HAZARD, *West Chester, Pa., Vice-President of the Pennsylvania State Dairymen's Association.*

The American dairyman, when he contemplates the vast results of the labors of his fellow-tradesmen, feels a thrill of pride that he is a member of a guild which contributes so much to the general wealth of his beloved country, furnishes palatable and now necessary food for so many millions, and lends so large amount toward equalizing the exchanges between this and foreign countries. It has heretofore been the case, too, that dairying districts, where the farming has to be of a mixed character, show more evidences of wealth, more thrifty farms, and a greater amount of intelligence than any others.

The Popular Taste.

The rapid increase of population, and, with it the greater number of consumers of dairy products that are non-producers, and also the accumulating prosperity of the people generally, create a demand for dairy products which has stimulated the faculties of the inventive class until we have every species of implement that can advance the interests of the dairyman, decrease his labor, and improve his products. Naturally, too, with the new methods introduced, the dairyman, or producer, has become also a commercial man or manufacturer. In many neighborhoods no longer is the private make, often of an inferior quality, carried to the store and traded for necessary articles, by the store-keeper to be worked up, good and bad together, and packed for shipment to the commission men. No longer do many farmers make their own product, and retail it in the nearest city or town; but, right in these towns are the creamery men, with their new separators, their butter-workers, and their printers, turning out an article of uniform excellence, in the most marketable shapes and appearances.

Increase of Price.

But, while the makes of a large portion of true butter have been exported, the prices obtained steadily for good articles have also stimulated inventions of the false butters which science has originated from other kinds of fat. The competition of these goods with the results of the labors of honest dairymen has not only lowered the price of all, but, for the time, pays the dishonest manufacturer the greater profit.

Yet, notwithstanding the amount of butters and imitation butters that are put upon the market, the price of good butter has steadily increased its average every five years. But, as the majority of private butter-makers make goods of an inferior quality, so the competition is keenest against them, and is thus felt by the largest number. But creamery men, and through them the milk-producers, are now feeling the effects of the base competition; the creamery less than the milk-producer, for the latter is paid *pro rata* what the former realizes, so that, in the end, the loss falls upon the producers, and the middle-men, as usual, reap their profit. Whether laws can be made, *and enforced*, to protect the producer, by denying the right to manufacture false butters altogether, or even to sell them without being stamped, remains to be seen. In a free country like this, every man may claim to manufacture and sell whatever is demanded by the people that is not prejudicial to public health, and it is not yet proved that imitation butter is any more injurious to health than the real butter, though our own experience is that it *is* hurtful. Inspectors may undoubtedly be appointed to see that the process of manufacture is not injurious; laws may be made that even every pound shall be stamped with its true name, but, can laws be passed saying that every restaurant or boarding-house-keeper shall notify every customer that they are eating false butter? What is to prevent the landlord from cutting off the end of every nicely-stamped and lettered pound of butter a slice laid upon the plate on its side, or even to slice off the top of the whole pound, and thus erase the stamped mark of ban? Who shall say how butter shall be served upon every table? Who shall say I shall not buy what I choose in the market? We believe every pound of adulterated butter should be taxed as whisky and tobacco are, if we cannot succeed in suppressing its entire manufacture.

If the increase of product of real butter is great—if the increase of manufactured imitations is also very great—the rise of the average price must be because there is an increased demand to be supplied. This must come, as we have said before, from an increased population, and a population with greater average riches than formerly. That both are the reasons, any one may assure himself by comparing the improved mode of living at the present day with that of his ancestors; the higher wages earned to support the luxurious living, and the material wealth that is universal in our no longer wild country. All this must be attributed to the beneficent effects of a tariff which keeps our money at home, makes foreign countries our debtors, and provides us with the best of all markets, a home one of well-paid and always-employed laborers.

The reports of the census shed much light upon dairy matters. They show, too, that the great bulk of dairy products is still the result of private skill; and that the home market for all these products is so vastly greater than the foreign market that it is important the home one should be the most cultivated; as it is easier reached, and the money is kept in circulation within our own borders.

Facts from the Census.

It is not worth while to go back farther than the last three decades, as within that period most of the dairy improvements and advancements have taken place, and most attention has been paid to the improvement of the dairy cow by the importation of thorough-bred dairy breeds.

By census of 1850, we had 6,335,094 cows, producing 314,345,306 pounds of butter and 105,535,893 pounds of cheese; a total of 418,881,199 pounds dairy manufactures; to be consumed by 23,191,876 inhabitants, or about 18¼ pounds to each.

By census of 1860, we had 8,585,735 cows, producing 459,681,372 pounds of butter and 103,663,927 pounds of cheese; a total of 563,345,299 pounds dairy manufactures; to be consumed by 31,443,321 inhabitants, or about 18⅛ pounds to each.

By census of 1870, we had 8,935,332 cows, producing 514,692,683 pounds of butter and 162,927,382 pounds of cheese; a total of 677,620,065 pounds dairy manufactures; to be consumed by 38,558,371 inhabitants, or about 17½ pounds to each.

By census of 1880, we had 12,443,120 cows, producing 806,670,071 pounds of butter and 243,157,850 pounds of cheese; a total of 1,049,829,921 pounds dairy manufactures; to be consumed by 50,155,783 inhabitants, or about 21 pounds to each.

Butter made on farms, 777,250,287 pounds; made in factory, 29,421,784 pounds.

Cheese made on farms, 27,272,489 pounds; made in factories, 215,885,361 pounds.

This shows an increase in 1880 over 1870 of 50 per cent.; over 1860, of nearly 100 per cent.; over 1850, of 250 per cent.

The growth in population does not show a proportionate increase to consume the unparalled increase of the last decade; for while in the previous decade the consumption by each inhabitant was 17½ pounds, in the last decade it was 21 pounds; and when we take into consideration the large amount of imitation butter also sold in competition with the above, the amount consumed per head would probably be nearer 30 pounds than any less.

But thus far we have neglected to speak of one important element in these statistics of consumption, and that is, the exportation of a large quantity of this increase of products: In 1879, we exported 38,248,016 pounds of butter and 141,654,474 pounds of cheese. In 1880, we exported 39,236,658 pounds of butter and 127,553,907 pounds of cheese; which is a yearly average export of 173,346,527 pounds of dairy products, and a home consumption of 876,483,394 pounds, showing that our home market is the most valuable to us, and needing the most consideration and cultivation; and yet the prices are much regulated by the foreign prices, for but one sixth of the whole product. Still it is better to have a foreign market in which to sell the surplus, and better equalize the law of supply and demand. If this exported amount was thrown on the home market, our dairymen would suffer the reduction of the prices.

I have not the figures at hand to show the exports of dairy products in 1850, but as they must have been very small, probably the eighteen and one fourth pounds consumed by each inhabitant is the correct amount; and if in 1880 we substract the amount exported from the total product, we shall find consumed by each inhabitant nearly seventeen and one half pounds. Thus, though the amount for each person has not varied much, yet, we believe, a better quality has been demanded, even at a higher price per pound.

To these manufactured dairy products we must add the amount of milk consumed by our people—a most important supply of food, containing all the elements necessary for nutrition, for making muscle, flesh, and fat. It is estimated this is forty-five per cent. of the total amount of milk yielded by the nearly 13,000,000 of cows, fifty per cent. being used in butter, and only five per cent. in cheese, though we hear so much of the large amount of cheese manufactured.

Private and Public Dairies Compared.

While one of the objects of an association as this is to further the public manufacture of these products, by developing the number of creameries, as relieving the household, and, at the same time, producing a more uniform quality of product, still we must nourish and enlighten and simplify the private production; for that is, and will be for a long time to come, the largest factor of dairy goods. The census of 1880 says that more than double of the amount of butter and cheese produced by factories was produced by private hands. The figures are:

	Factories. lbs.	On farms. lbs.
Butter, ...	29,411,784	777,250.287
Cheese, ...	215,885,361	27,272,489

Or, of total products, 559,215,631 pounds more made on farms than in factories, and in money value $168,077,356 more than is produced by factories. These proportions are, however, changed more and more each year.

Proportion of Increase of Cows.

The question next arises, Have we increased the number of cows and the number of inhabitants in relative proportion? If so, then we have not advanced so very much, and if not, then we must have increased the product of each cow by superior selection, feeding, or breeding. Here statistics, those dry facts, will help us:

In 1850, we had 6,385,094 cows and 23,191,876 inhabitants; in 1880 we had 12,443,120 cows and 50,155,783 inhabitants, or in 1850, 65.77 pounds to each cow, or 18.06 pounds, and in 1880, 84.37 pounds to each cow, or 20.93 pounds to each person, the increase being eighteen per cent. in products, and 2.87 pounds per head of products, or, in other words, we increased the amount of product so much of each cow that, notwithstanding the population has increased to more than double in the last thirty years, yet we are able to give to each consumer nearly three pounds more than formerly.

When we look around us and see the many improved grades of cows, the rapidly increasing number of thoroughbreds of dairy stock, and we see at the same time our barns larger, warmer, and in every way more cleanly, convenient, and comfortable, and contrast those with the bony, gaunt, and shapeless cows that formerly hunted around a straw-stack or shivered in neglected barns, we must consider we have made advances and are reaping the benefit of it, as well as increasing our self-respect.

This is one of the most important lessons that the census teaches us, that we can increase our products with but little more expense. With care, our animals can be raised to so much higher grade that the percentage of profit to each animal can in various ways be increased.

Is Improved Stock Profitable?

Does it pay for us to improve our stock and increase our products? Formerly, the production would hardly average much over one hundred pounds per cow for the year; now, it is not considered a very excellent cow that gives less than two hundred pounds per annum, and a good herd will give nearer three hundred pounds per annum. But this increase of product cannot be made without increased cost, but the net increase of profit will be greater.

To increase the product, we must have better tilled farms; better and more comfortable, and, therefore, more economical barns; more careful and better feeding; products put into the most marketable shape; better grades of cows, of recognized superior breeds, carefully selected for their intended purpose.

It is evident that, if we can increase the product from two hundred to three hundred, we gain fifty per cent. That is to say, if one cow now gives but two hundred pounds, and if, by the various processes stated, they can be made to give three hundred pounds, we shall require but two cows to do the work of three cows. Therefore, by maintaining two cows we save the feed of the third cow. This, at first glance, would show there was a profit of one hundred pounds extra, but this will not be quite the case, for we must calculate the cost of improving the barns, better stalls must be made, more roomy, better ventilated, and easier cleaned, and the cracks between the boards must be battened; of better feeding the stock, maintaining them in every portion of the year in uniformly good condition, by feeding more concentrated foods; the tillage will cost somewhat more, for more food must be raised upon the same ground, and, by raising two crops where we now grow one, will require some increased labor, whether it comes from ourselves or from extra help, but it will pay; to put the products into shape to bring the highest price will require improved implements and dairy houses, and more labor, and, finally, for a time we shall have to buy more expensive cows.

The latter idea is the main topic of our address—Will it pay us to buy higher-priced cows? Within five years past, the cow that was known to produce fourteen pounds per week became a noted cow. Reports of such cows induced others to test some of their cows, and efforts were made to bring certain cows up to that standard, so that now a list, which at first comprised some forty cows, is now extended into a list of several thousand of fourteen pounds and over. That shows that we ought to test the capabilities of every cow upon the farm, so that the poor ones shall be weeded out, and the good ones improved by extra care and feeding.

Such is the demand for cows of that character that they bring a greatly increased price, and the faster they rise in the scale of yield, the price rises in a much greater proportion, until, lately, if a fourteen-pound cow, of excellent pedigree, would fetch $800 to $1,000, one of sixteen pounds would bring $1,000 to $1,500; a twenty-pounder would bring $3,000 to $5,000, and a twenty-five-pound cow would fetch $10,000 to $20,000. But take a fourteen-pound cow, and her butter will cost but one half as much to make as that of the seven-pound animal, while her calves will bring a much increased price; and just as they rise in their yield of pounds, the price rises, because they are fewer and not enough to go around to supply the demand of the wealthy breeders. It should, therefore, be our aim to produce the twenty-pound cows. Keeping that steadily in view, we can accomplish it, or go a long way towards doing it.

Breeding Rules.

It is a rule of breeding that nature left to itself will retrograde, advancing only in exceptional cases; and this is because the law is to maintain the race in only sufficient numbers to perpetuate itself, and the survival of the fittest is the result. But, if we assist nature, and put all kinds of guard around it, and intelligently direct her forces, we may accomplish results that, unaided, she could not and would not be able to do. First, we must make up our minds what we want to produce; and, secondly, we must work intelligently by well-known laws to produce that effect.

The Best Breeds.

Fortunately, we have the work mainly done for us, and it is the art of selection that we must follow. Certain breeds have been perpetuated for thousands of years for special purposes, and using those breeds, we have a most excellent foundation to work upon. We have, therefore, for dairy purposes, three breeds that it would be most advisable for us to build upon, for their types have become fixed. These are what are called the Channel Island cows, the Jerseys and Guernseys, because they come from the islands situated in the channel between France and England, and the Dutch-Friesian animals.

The Jerseys, formerly of larger size than the majority that we see at this day, have been so improved by breeding on this side of the water, as to be the strongest proof of our ability to advance the merits, even of a long-established breed. The Jerseymen, satisfied with the well-doing of their animals, paid but little attention to their improvement as yielders, and bred promiscuously and badly until fashion set in for certain colors; then, keen to make every shilling, they bred for color, another strong proof of what may be done. Now that the price is based upon performance, a Jersey Farmers' Association has been recently formed in the Island to make tests of yields, and advance the interests of those breeding for yields. This will do much to bring out such yields on the Island as we have done here, and large as have been the yields already reported, of twenty-eight pounds per week, and one hundred pounds per month, we may look for still more phenomenal yields. Thus the Jersey has proved itself a first-class animal for the butter dairy, and that her proclivities are all that way, needing only to be encouraged and developed. Consequently, the more Jersey blood we have the more likelihood of a good yield.

The Guernseys.

So with the Guernseys, so rich that she deserves the specific title of "the quality cow;" giving the richest of milk, milking the most continuously, self-coloring her butter, even in winter. [Our views of this breed are expressed more fully in another part of this volume.]

Dutch Breeds.

The Dutch cattle also have been bred for over two thousand years for the purposes of milk, cheese, butter, and beef.· The Friesians have had the pen used more freely of late to tell of their performances at the pail and the churn. Yields of milk, of eighteen to twenty-three thousand pounds in one year, have been told of lately, and the butter yield, which was formerly supposed to be small, and the milk was consigned to the cheese factory, is now shown to be large, nearly one hundred pounds having been given by Mercedes in one month; and the milk of a herd of thirteen Friesians in my neighborhood was taken to the West Chester creamery, and the few quarts required to make a pound of butter proved what a chemist's analysis had already declared was the case.

Is it Profitable?

Now, if these undoubted facts about these three dairy breeds are accepted—facts which show them to be superior to the mongrel cows found on most Pennsylvania farms—the only question remains, Will they pay the farmer to raise, to keep, and to rely upon? And, if so, how best to get them at a price he can afford?

If he cannot get enough money out of the old stocking, or out of the amounts he has lent out on mortgage, to buy the pure registered stock, let him have the grades of either of these breeds I doubt whether, unless the farmer is a very careful man, and has a strong love for it, whether it is profitable for him to undertake to breed the pure cattle. If so, and he wants to commence immediately, let him purchase a good, pure-bred registered bull. They can be had now for from fifty to one hundred dollars, according to age and quality; and why the scrub bulls are purchased I cannot conceive. I know farmers will say because they can be had cheaper, that they get larger calves, and that they don't raise their calves. Neither of these are weighty reasons to me. The scrub bulls are not cheaper at any price, and the calves ought to be raised and not sold. The plan of buying fresh cows at the village inn sales, keeping them for a season or two, and then selling them to the butcher, is not a good one, and will not foster any love of breeding good stock. No; get a pure-bred bull, especially a rich Guernsey; cross on your stock; keep on doing this by a little in-breeding, and, in a few years, you will find yourself a contributor to increasing and improving the dairy facts of the census, and, therefore, of the country, elevating your own and your country's reputation and adding to its wealth.

BOGUS BUTTER SOPHISTRIES ANSWERED.

By Milton George, *editor of "Western Rural," Chicago.*

The bogus butter manufacturers have distributed circulars, one of which begins by saying that "misinformed or ignorant newspaper writers have labored to mislead the public regarding butterine or oleomargarine." It is true that such writers have done so, but they always have written in favor of the bogus butter The circular goes on to state that it is dishonestly claimed that bogus butter has unfavorably affected the value of dairy products. It attempts to prove that the contrary is the case by saying that the price of butter has averaged better since the bogus butter has been in competition than before. The reiteration of this rot makes us tired. To use our old illustration, if there is a demand for a hundred pounds of creamery butter, and half the demand is supplied by oleomargarine, any fool ought to know that the value of creamery butter has been unfavorably affected. Therefore, the logical conclusion is that if the bogus products were not in the market, creamery butter would be much higher than it is. Then the circular goes on to say that bogus butter manufacturers are large buyers of fine butter, and that this increases the price. Now, let us see how that matter stands. It is claimed that a very large per cent. of fine creamery butter goes into the manufacture of oleomargarine and butterine. It is further claimed that, to all appearances, the bogus product is as good as the genuine. It is also very properly claimed that everybody is after good butter. Now, the demand for good butter results in the consumption of all the creamery butter made—whether mixed with adulterations or not—and the lard and tallow that are used in the manufacture of the bogus butter besides, these being consumed under the belief that they are pure butter. Then, suppose we take away the percentage of lard and tallow that is in the bogus butters. That would leave a deficiency in what is supposed to be first-class butter, would it not? And what is the natural effect of a lessened supply of an article of commerce? Higher price, is it not? The writer of the circular has thus reached a barbed-wire fence that will scratch him pretty deeply before he gets over it.

Next, the circular says that "artificial butter has, and justly, checked the sale of rancid, poorly made, dyspepsia-breeding dairy butter." When did rancid butter ever have a sale? There is a great deal of talk about the terror of rancid butter. What we want to find now is a single man or woman in all the world who ever bought a pound of rancid butter, and didn't return it at once to the store, unless it was bought for cooking purposes. It was never bought for the same purposes as those for which oleomargarine or butterine is bought. And now, if it is not rancid, if it is not decayed, what is there about poorly made butter that will give anybody the dyspepsia? It may not have a good flavor, but there is nothing about butter to breed dyspepsia. On the contrary, if there is any one thing more chargeable than another for causing dyspepsia it is the fat of swine. We notice this simply for the purpose of showing that these fellows hesitate at no deception. Next are appended a lot of certificates of the wholesomeness and purity of oleomargarine. A Yale professor, for instance, is made to say: "In regard to 'worms' in beef fat, I will state definitely that no such instances are known to occur, nor has trichinæ been observed in the fat or flesh, except when embryos have been purposely fed to the animals before killing them, for experimental purposes." We have one very substantial answer to what is meant to be stated here, that bogus butters contain no worms, trichinæ, etc. It is this: We have found the worms, and have published the cuts of what we found several times. We found, too, pieces of muscle, and that may contain worms or trichinæ; and any man who will make such a statement as the one we have quoted, as applied to bogus butters, is either a fool or a knave.

"Let the manufacture of artificial butter be prohibited," says the circular, "and every farmer will be out of pocket ten to fifteen cents per hundred pounds," referring to hogs. Now, we will see how much the farmer would make if that were true. If he had five hundred hogs weighing four hundred pounds each—this is an extravagant estimate—he would get thirty dollars. He would get thirty dollars for encouraging a set of Chicago sharpers to ruin the dairy business of the country; thirty dollars for enabling these fellows to impose upon the public; thirty dollars for encouraging dishonesty in commerce. If we thought that there were five hundred farmers in the West who would do that, we should be ashamed of our class. But what would he lose by having good butter crowded out of the market? A man who had five hundred hogs would pretty likely have at least ten cows. That is an under-estimate on the average. Now, from ten cows he ought to sell in a year six hundred pounds of butter. Certainly that is a very low estimate. If it is good butter, and oleomargarine and butterine are supplying a good portion of the demand for good butter, it is a fair estimate to say that he will lose five cents a pound. There is a loss of thirty dollars. He has made thirty dollars then in one way and lost thirty in another. His books balance, but the fellow who prompted the writing of this circular has swelled his bank account tremendously. It need not be feared but that he will come out all right. But suppose the butter is not first-class. Then the loss will be more than thirty dollars, according to the bogus butter people themselves. They say the bogus products are driving the inferior grades of butter out of the market. The fact is, these fellows open their mouths too wide—they fall into them; they prove entirely too much for themselves. The circular plainly says that it is the aim of the bogus butters to take the place of, inferior butter. In other words, they openly announce that they are making war upon thousands of our farm dairies in which butter is made that will not come up to a creamery standard, and yet it is good butter and fit for anybody to eat. Now, if the farmers of this country are blind enough to be led by these fellows into a conflict against their own interests, through the false promise of getting a little more for their tallow and lard, we mistake the intelligence of the farming community. But we are not mistaken in that intelligence. Our farmers can see through all this sophistry, and will stand firmly for honest butter.

MILK PRODUCTION.

The Business of Making and Selling Milk as Viewed by a Consumer.

In the present unsatisfactory condition of the milk business, there is little danger that too much thought or attention will be given to it, especially by the consuming classes, those who have, apparently, been the last to take any special interest in the business. Prof. Wm. H. Brewer, who chose this subject for his lecture before the Connecticut State Board of Agriculture, was born and bred on a farm, is professor of agriculture in the Sheffield Scientific School at New Haven, in which city he is chairman of the board of health, and is also an expert in the use of the microscope, and has made a special study of those low forms of vegetable or animal life known under the general name of bacteria and ferment germs.

In tracing the growth of the milk trade, he found that it is but a comparatively short period since nearly all the milk consumed in cities was produced in or very near to the cities in which it was sold; also that the daily consumption *per capita* was formerly very small, London, in England, using only from one ninth to one seventh of a pint per day to each inhabitant. As the supply began to come in from a distance, by railroad, the consumption increased, till in later years the people of the same city have used from one sixth to one fourth of a pint per day. New York has used as high as from one third to one half pint per day *per capita*, which is certainly not an extravagant quantity, considering the fact that pure milk, of good quality, is one of the cheapest forms of animal food sold in our markets. As late as the year 1850, there were as many as four hundred cows kept in stables upon Long Island, and fed chiefly upon the wastes from the whisky distilleries. It is in these same districts that the contagious disease pleuro-pneumonia has obtained such a foothold as to threaten the destruction of the entire cattle industry of the country. At present, by the aid of steam transportation, milk comes from a greater distance, but most of it is still made within fifty to sixty miles of the city. It is no longer practicable, as formerly, for the milk producer to sell his milk direct to the city consumer, but it must be handled by a third party. This places both producer and consumer at a disadvantage. It is very difficult to fix wrongs where they belong. In his own city of New Haven there were no regulations for controlling the supply and sale of milk, and in a large city like New York the dangers attending the business are still greater. He was aware that it had always been found difficult for governments to regulate the sale of foods, and that in time of scarcity mobs have ruled and blood flowed freely. Yet the public safety calls for restrictions in the sale of foods, and especially in the sale of milk.

Though milk is one of the best foods, and always must be, and is exceedingly nutritious to all except a few who cannot digest it, it is a mechanical mixture of compounds which rapidly decompose after a short time, and the decomposition is due to minute living organisms, microbes, or bacteria, forms of life that are peculiar, as those which change milk from sweet to sour, and others that cause it to become ropy. These organisms are not destroyed by cold but are by heat. Milk is also subject to mechanical changes, as when the cream or fatty portions rise to the top, leaving the heavier blue milk below. As the specific gravity of milk varies from ten hundred and twenty-six to ten hundred and thirty-six, and the fatty portions from two per cent. to twenty-five per cent., and varies from the same cow from day to day, as the cow's food varies, and from other causes, it is impossible to have a natural standard of purity for milk, and any standard that may be adopted must be an artificial one. In New Jersey a standard has been adopted which calls for twelve per cent. milk solids. In England eleven and a half per cent. milk solids is the legal standard, and the fatty portion must equal two and a half per cent.

In Dr. Jenkins' experiments in analyzing milk in Connecticut, he found seven samples that fell below any of these, and even in the herd of Guernseys owned by Mr. Norton of Farmington, the variations were very marked. The sugar varied the least; yet that ranged from one hundred to one hundred and twenty-eight; the casein from one hundred to one hundred and thirty, and the fat from one hundred to one hundred and sixty-nine; so he found it quite difficult to buy milk for his creamery and pay for it what it was actually worth.

There is no other vocation in which the honest man suffers so much at the hands of dishonest men as in the sale of milk. It will not pay the purchaser to sue his milkman at law for a two-cent fraud in the sale of his milk, so government restrictions and a legal standard of purity are needed. Milk, butter, and cheese will all absorb disagreeable odors very readily; but worse than that, milk will absorb infective germs of many kinds. A typhoid outbreak in the city of London, which destroyed nearly one hundred persons, was traced to the source of the milk-supply of the families in which the deaths occurred. Enough has been written on this subject during the past ten years to make a book as large as Webster's unabridged dictionary. It is a very difficult question to decide just how much a cow may be diseased, or out of condition, to have her milk unfit for food. It is claimed by some, and denied by others, that the milk from cows suffering from pleuro-pneumonia is unwholesome. It was the speaker's belief that the milk of no diseased cow should be offered for sale. He did not believe that oleomargarine was poison or unwholesome, but he did not want to buy it or to eat it for butter; and the man who sells it to him should be prosecuted; and the same rule he would apply to all kinds of food. He would, also, have the punishment for such offenses imprisonment. A fine is not sufficient. We have no positive proof as yet that the milk from cows affected with tuberculosis, or consumption, will give the disease to children, though we know that calves will take it in the milk. The risk is too great to run.

There is a great deal of skimmed milk sent to New Haven from the creameries, and sold to peddlers at the wholesale prices for skimmed milk, but he had yet to learn that the retailer ever sells it as skimmed milk. Such milk is perfectly wholesome for persons who eat other food, but it is not fit for young infants who take milk solely. It needs the cream to make it a perfect food for infants. It is because of the difficulty of controlling its sale that the New York city people were compelled to shut down on its sale at any price. The lecturer had known of an infant starved to death in consequence of the cream of its milk being removed and drunk by a lusty servant girl. It had been found in New Haven, that sixteen out of eighteen children that died under two years old had been fed upon poor milk. New York made forty thousand inspections of milk last year, and the effect had been very salutary, but he believed that inspection will yet have to reach the cows in the stables, and the honest producers will be benefited rather than injured by such inspection. Milk should pass from the producer to the consumer under lock, so that it cannot be tampered with, and so that fraud can be placed where it belongs. A good deal of the present difficulty comes from the prejudices of consumers and their unwillingness to pay an extra price for a good article. He could not blame producers for making as poor milk as they could produce honestly, so long as consumers will pay no more for good milk than they will for poor. He had no doubt that in the near future milkmen would be required to procure a license to sell milk, and that in case of fraudulent sales their license would be taken away as part of the penalty. It had been shown by inspection that New York has paid ten thousand dollars per day for the water added fraudulently to her milk supply.

MILK.

By Dr. JOHN AUGUSTUS VOELCKER, *Consulting Chemist.*

The produce of milk in Great Britain, according to the estimate of Mr. J. C. Morton, is about one thousand million gallons annually, computed upon the number of cows and heifers in milk and in calf, which in June, 1877, amounted to two million two hundred and fifty thousand. This consumption means an annual revenue of twenty-six million pounds, arising from the sale of milk and its products. Of this quantity of one thousand million gallons annually, it is estimated that about one sixth part is used in calf-rearing, one third represents the annual consumption by the people in the form of puddings, &c., while the remainder, amounting to one half of the entire produce, is employed in the manufacture of butter and cheese, the quantity of the milk required for cheese being about twice that required for butter.

Importance of the Milk Supply.

During recent years, owing to the continuing depression of agriculture, the attention of farmers in the United Kingdom has turned more and more to the conversion of a considerable part of their arable land into permanent pasture, in the hope of recouping themselves for their losses in the growth of cereals by the better returns realized from the sale of dairy produce. As the outcome of the "bad times" for agriculturists, in many parts, large farms had been sub-divided, as it is found that small farmers can stand the exigencies of depression better than big ones. A small farmer, if he keeps any live stock at all, can always keep a cow, and with it the advantages of returns in the form of milk, of butter, and, thirdly, offal for pigs, without having to employ a number of hands, so that the inducement to convert arable land into grass is one that can be well understood, the produce always finding a ready sale and use.

Taking, for instance, the last three years, 1881, 1882, and 1883, we find that, in the United Kingdom, while there has been a decrease in the acreage devoted to corn crops from 10,650,000 acres in 1881 to 10,300,000 acres in 1883, there has been an increase during the same period in the acreage of permanent pasture from 24,760,000 to 25,288,000 acres, the decrease and inrease respectively taking place alike in Great Britain and in Ireland. At the present time, the acreage of the United Kingdom under corn crops is 10, 326,000 acres, under green crops, 4,908,003, while that under permanent pasture, and not including grass broken up in rotation, heath, or mountain land, is 24,288,000 acres. Sir James Caird, in his report on the condition of British agriculture in 1877, gives the increase of permanent pasture in Great Britain during ten years up to 1877 as eight per cent. of the whole, amounting to 1,000,000 acres; while in three years, 1881 to 1883, the increase reached nine per cent. These figures will suffice to show that the production of milk is occupying a position of increasing importance in British agriculture.

Composition of Milk.

I shall now ask your kind attention to the consideration of milk as regards its composition. Milk is a secretion of the mammary glands of animals belonging to the order Mammalia. Opaque and generally white in color, it has a sweetish taste, and but faint smell. Its chemical reaction seems to be generally slightly alkaline, though chemists have frequently found specimens to be acid. Human milk has been found in a few cases to be neutral, in all others, alkaline. When the milk of herbivorous animals is found to be acid, as is sometimes the case, the result is believed to be due to extraneous causes, (the nature of the food, &c.;) while, in contradistinction, the milk of carnivorous animals, such as dogs and cats, is always acid. Milk is somewhat denser than water. Its specific gravity differs according to the source from which it is derived: thus human milk has a specific gravity of about 1.030; cows' milk, 1.029-1.034; goats' milk, 1.030-1.035; ewes' milk, 1.03-1.04; asses' milk, 1.02; water being taken as 1. Both human milk and asses' milk are sweeter than cows' milk; while goats' milk possesses a peculiar odor and somewhat insipid taste, and generally is richer in fat and casein than cows' milk. When deprived of its cream, milk assumes a bluish color. Microscopically considered, milk is a clear liquid, having an immense quantity of round or oval globules, called the "milk globules," floating in it. These are articles of fat encased in an external envelope of casein. The liquid in which these globules float is a solution in water of the following bodies: casein, albumen, milk-sugar, and mineral matters.

Popularly speaking, we divide milk into cream and skim-milk, as, on standing, it separates itself into these two portions; when kept still longer, we are aware of its turning sour and forming a curd, the clear liquid left when the curd is removed being called whey. The cream contains the fat globules, which, on account of their lightness, rise to the surface. These fat globules, together with water, constitute about ninety-five per cent. of the cream, the remainder being small quantities of casein, with sugar and mineral matters. From the cream butter is manufactured by the process of churning. The curdling produced in milk, when it turns sour after keeping for a few days, is due to the separation of the curd or casein, in consequence of the formation of lactic acid from the milk-sugar. The same effect of curdling may be produced by the action of an acid added in excess to either new or skimmed milk, or by the action upon it of rennet, a watery extract prepared from the fourth stomach of a calf. It is on this principle that cheese is manufactured. We must now, having briefly explained the general appearances presented by milk in its different stages of keeping, consider somewhat more closely its chemical composition and nature.

FAT.

1. *Fat.*—The fat of milk, as contained in the milk globules which we have spoken of as rising to the surface, and with water forming almost entirely the cream, consists of compounds of glycerine with palmitic and oleic acids for the most part, though other acids are also found in small quantities, such as stearic, capric, butyric acid. These compounds are called glycerides. Some of them are liquid fats, others solid. Palmitin, the glyceride of palmitic acid, constitutes nearly seventy per cent. of pure butter, and is a solid and crystallizable substance, while olein is a liquid fat, and is contained in butter to the extent of nearly thirty per cent. The proportions of these solids and liquid fats in milk vary, to some extent, according to the diet of the animals, their condition, the time of year, and so on. The oils mentioned seem to impart to butter the particular flavor and smell it possesses. The globules are inclosed in a thin case of casein, which is broken during the operation of churning, and the contents form the butter. The globules are of very different sizes, varying from .0005 inch in diameter to one tenth of that size, and differing, also, according to the breed of the cow supplying it, the amount of shaking the milk has been subjected to, &c. The largest globules are the quickest to rise, and a milk rich in these will make most butter, while, on the other hand, the smallest never rise at all, but remain behind in the milk, which will then yield a better cheese on this account.

CASEIN.

2. *Casein.*—This is an albuminous substance, very closely resembling vegetable casein, or legumin, in its composition and properties. Carbon, hydrogen, nitrogen, and oxygen, with small quantities of sulphur and phosphorus, are its ultimate constituents, its quantitative composition being as follows: Casein: Carbon, 53.57; hydrogen, 7.14; nitrogen, 15.41; oxygen, 22.03; sulphur, 1.11; phosphorus, .74; total, 100·00. When milk is kept until it turns sour, the casein, which before was in solution, is precipitated as a white mass, known as the curd, on account of lactic acid, through the fermentation of the milk-sugar. Casein itself is not coagulated on boiling, and so differs from albumen. It is readily dissolved by dilute alkalies,

though the existence of free alkali to keep it in solution has not been established. The action of rennet in milk is not satisfactorily explained, either, though it is known that the formation of lactic acid from the milk-sugar is not the agent in the process, for milk is coagulated by rennet without making it at all acid, as Dr. Voelcker showed; and even when he rendered milk purposely alkaline, he yet found that rennet separated the casein, leaving the solution still alkaline. When milk is gradually heated up to the boiling point, a skin is formed on the surface, and this skin is casein, which has become oxydised, and in this state it is insoluble in water. In the making of Devonshire cream, in which process the cream is scalded, there is some quantity of this insoluble form of casein found in the cream. Casein itself, when exposed to the air, undergoes a change, becoming a ferment, which has then the power of breaking up, partly, the fats of butter, which we have seen to be glycerides of the fatty acids, and themselves non-volatile and inodorous, and resolves them into their constituents—viz.: glycerine and the volatile fatty acids, butyric acid, &c., which have distinct odors, and give to butter the smell which is commonly described as that of "rancid butter." Hence the exclusion, as far as possible, of the curd from butter is a point of much importance, and is effected by frequent washings with fresh water, and working the butter well. The fact that butter made from scalded cream, as is done in Devonshire for home consumption, keeps longer fresh than other kinds is due, no doubt, to the formation of this insoluble curd by the heating the milk, and this takes longer to decompose than is the case when the cream is not scalded. As our right honorable chairman will, however, tell us, no doubt such butter is called a "creamery" butter, and is not able to compete with the first-class butter sold in London, though in so high favor with Devonshire consumers. Considered in the light of food, casein is highly nitrogenous, and is, accordingly, a flesh-forming body. In addition to some quantity of phosphate of lime, which adheres with great obstinacy to casein, the presence of phosphorus as well as of sulphur, in organic combination, was first established by Dr. Voelcker.

ALBUMEN.

3. *Albumen.*—In addition to casein, yet another nitrogenous body, similar to the white of egg, or albumen, is found in milk. It differs from casein in that, after the curd has been removed from milk by rennet, if the clear solution of whey is boiled, a coagulation of an albuminous matter takes place. Strangely enough, however, this does not occur when fresh milk is boiled, but the separation of the casein by rennet or acidification must first be effected before the albuminoid substance becomes coagulated. It possesses all the properties of the albumen of eggs.

MILK-SUGAR.

4. *Milk-sugar.*—This is the principal ingredient of the whey which is left from milk after the removal of the curd and albumen by rennet and subsequent boiling. If the solution of whey be gradually evaporated down, the milk-sugar begins to separate out in crystals, and will readily collect round strings or sticks immersed in the liquid, so that the milk-sugar can be obtained as a hard mass, consisting of a large cluster of crystals. In shape these are hemihedral, white in color. They have a sweetish taste, but it is not nearly so massive as that of either cane or grape-sugar. The milk-sugar, if finely powdered and put upon the tongue, gives a gritty kind of feeling; it is soluble in water, but less easily than the other kinds named,

which accounts for its less massive sweetness. Viewed with the polariscope, a solution of milk-sugar possesses a power nearly equal to dextrose in rotating a ray of polarized light. When pure, milk-sugar will keep perfectly well without undergoing any change, but occurring as it does in milk along with casein, and exposed to the air, it is partially under fermentation. some of the milk-sugar or lactose being converted into lactic acid, while, as observed already, it produces the coagulation of the casein, forming the curd of sour milk.

SALTS OF MILK.

5. *Salts of Milk.*—These are the salts which are left behind as a white ash when milk is evaporated down to dryness and then ignited. Analyses of this ash have been repeatedly made, showing the principal constituents to be phosphate of lime, phosphate of magnesia, and the chlorides of potassium and sodium. The ash has a distinctly saline taste. Some small quantity of carbonates is also generally present.

Thus far we have considered the chemical constituents which enter into the composition of milk—their several properties, the changes which they undergo, and the part they take, individually, in forming the sub-divisions of milk—viz: cream, curd, whey, &c. The consideration has, however, been of a purely qualitative character, and not in relation to the quantitative proportions in which the constituents are found in milk. This I purpose to deal with shortly, in the analytical part of the present paper.

SOURCES OF OUR MILK SUPPLY.

Prior to doing this, I intend to make some remarks upon the sources of our milk-supply, and, as a preface to the general statement that milk, analytically considered, as I shall endeavor to show later, is far from uniform in its composition, will touch upon those differences which are apparent to those who have had neither chemical training nor analytical experience; such differences, I mean, as are the result of one or another breed of cows being selected as milk-givers, of varied methods of feeding, or of particular times and seasons, all of which exercise an important bearing upon the quality and composition of the milk produced. The chief dairying counties of England are Cheshire, Lancashire, Staffordshire, Warwickshire, Derbyshire, Leicestershire, Gloucestershire, Berkshire, Somersetshire, and Wilts, and the principal breeds of cattle employed are the Shorthorns, Longhorns, Herefords, Devons, Polled Angus, Welsh, Sussex, Norfolk Polled, Highlanders, Ayrshire, and Channel Islands, and of those we may consider the Shorthorns, Norfolk, and Channel Islands breeds as especially dairy cattle. For the annual produce of one thousand million gallons, it is computed that two million two hundred and fifty thousand cows and heifers, in milk or in calf, yield, within the twelve months, four hundred and forty gallons apiece. The average yield of good cows is considerably higher than this, being some six hundred to seven hundred gallons, annually, while there are instances of yields of nine hundred and one thousand gallons per annum for a single cow. Cows are generally put to the pail when from two to two and one quarter years old, and, as a rule, produce a regular supply of milk for ten months of the year, remaining dry for about two months. Large suppliers of milk, who are concerned more about selling it in quantity than for its profitable conversion into butter and cheese, are able to prolong, considerably, the period during which the cows yield milk by feeding them with very succulent food.

Immediately after calving, the first milk given by the cow is of a very thick nature, and yellow in color. It is termed colostrum, and differs from ordinary milk in composition, containing an especially high percentage of casein. This colostrum is yielded for about ten or twelve days, after which milk, as we are generally acquainted with it, is given in most plentiful supply, diminishing gradually after about a month, till the supply at last runs dry.

MILKING QUALITIES OF CATTLE.

Of all breeds of cattle, none hold so high a place as the Shorthorn: and this is the case, not only when it is regarded as a meat-producing animal, but also for dairy purposes. The Shorthorns are universally considered as deep milkers, and their use in herds such as those of Sir Hussey Vivian, Mr. Tisdall, and others, amply bears this out. Two other points are of the greatest importance in considering their advantages as dairy cattle. Firstly, the possession by them in the highest degree of transmitting their milking properties, on which account also they are eminently suited for crossing and improving other breeds by imparting a Shorthorn character to them; secondly, the readiness with which the cows, when they have ceased to yield a remunerative supply of milk, will lay on meat of excellent quality. In addition to these two chief points, there are others, such as their early maturity, robustness, and excellence in rearing their offspring. So we find that our dairy cattle are getting stamped more and more with a Shorthorn character. In Sir Hussey Vivian's herd, the average produce of milk is seven hundred and fifty gallons per cow per season; while one Shorthorn cow gave no less than one thousand gallons of milk between calving and calving, and had two calves within twelve months. Mr. Tisdall, of Holland Park Farm Dairy, speaking of his Shorthorns, gives for them an average of 10.33 quarts per day for ten and one half months, and says: "If properly selected from the best families and properly fed, Shorthorns will produce as much milk, and much more beef, than any other breed."

The Longhorn was formerly a dairy breed in great favor, but is being much replaced by the Shorthorn. It yields milk which is generally not so large in quantity, but which is considered richer than that of the Shorthorn. It is especially rich in curd, and to quote a comparative instance, there is one of a herd of Shorthorns producing 605 lbs. of milk, which yielded 66½ pounds of curd, while the same number of Longhorns gave only 553 lbs. of milk, but yielded 69 pounds of curd.

The Herefords are not thought much of for their milking properties, but when allied to the Shorthorn they are uncommonly good. Mr. Tisdall mentions a cow in his herd, a cross between a Hereford and a Shorthorn, which gave the best record of all the herd. The practice with Herefords is to let the cows suckle their calves in the open field; and this is not conducive to their giving so large a supply of milk as would otherwise be the case, milking by hand being much more exhaustive than suckling.

The Devons give milk of high quality, and may be considered fair milkers, and much superior to the Herefords. The Sussex breed are not good milkers; but the Norfolk and Suffolk Polls possess good milking properties, and do not easily go dry. The Welsh cattle are also good. The Scotch Highland and Angus cattle give milk which is very rich, but there is very little of it, and they have a tendency to go very soon dry. There remain, lastly, the three important and essentially dairy breeds, the Ayrshires and Channel Islands cattle. The Ayrshire cow is the cow of Scotland, very hardy and small in size, with short legs and comparatively long body; not so large as a Devon, it is an excellent milker and thrives well even on poor land. The Channel Islands breeds, the Jerseys and Guernseys, popularly known as Alderneys, in proportion to their size give more milk of richer quality than cows of any other breed. An average return of butter from them is 220 to 240 lbs. per cow yearly. They are, however, not good beef-makers. If a single cow is kept for milk or butter, it is generally a Jersey cow. To our list we may add the Kerry cow of Ireland, diminutive in size, but producing for that size a remarkable quantity of milk; and, lastly, the imported Dutch cow, which yields exceedingly large quantities of very watery milk, and which is in much favor where quantity rather than quality is the object.

The difference of breed, then, is of account both as regards the quantity and quality, and hence the composition of milk. Experiments made further, on large-sized and small-sized cows of the same breed, when fed on the same kind of food, have shown the large-sized ones to produce a better return of milk.

FOOD OF DAIRY CATTLE.

The next influencing element to consider is the nature of the food supplied to the cattle. In the experiments which Dr. Voelcker carried out on the Royal Agricultural College Farm, at Cirencester, this influence is most clearly shown. To quote from these some few particulars: The herd of cows was out in grass from May till the end of October, but the herbage getting then poor, they were fed in the evening in the stall with hay, roots, &c. The pasture at the college farm was very poor and insufficient, and analysis of the milk in September showed water 90.70, and fat 1.79 per cent., a very poor milk indeed; while on another farm close by, where the cows, too, were out in grass, but where the supply was ample, the milk was of very good quality, and showed only 87.20 per cent. of water and 3.76 per cent. of fat, or 3½ per cent. less water and 2 per cent. more fat. In October, when the pasture at the college farm was so poor that the cows were fed in the evening with hay, roots, and meal, and grazed in the fields during the day, the morning's milk showed, on analysis, 87.60 per cent. of water, and 3.90 per cent. of fat, while, after coming in a night from the field, the evening's milk analyzed as follows: Water, 90.30 per cent.; fat, 2.99 per cent., or an increase of nearly 3 per cent. in the water, and decrease of 1 per cent. in the fat, due to difference of feeding, and showing that the concentrated food given at the evening meal produced a rich morning yield. In November, and a few months on, the cows were kept altogether in the stall, and fed on roots, oil cake, straw-chaff, &c., and the effect was apparent in the better quality of the milk produced, and in the comparatively small disparity between the morning and evening's milkings, which analyzed: November—morning, 87.10; fat, 3.41 per cent.; evening, water, 86.20; fat, 3.78 per cent. December—morning, 86.70; fat, 3.74 per cent; evening, water, 86.00; fat, 4.12 per cent.

Numerous other experiments have been made and recorded, and keepers of dairy stock are practically well aware of the influence of food both on the quality and quantity of milk. The use of brewers' grains, for instance, it is well known, tends to produce a larger amount of milk of poorer quality—so, also, wet grass and other succulent foods—while concentrated food, such as linseed and cotton oil-cakes, give a better and richer quality to the milk. It is also known that a particular food taken in quantity is likely to impart its particular flavor to butter made from the milk of cows that fed on it—for example, the turnipy flavor imparted to butter where cows have been largely fed on turnips. Whether this is the case as regards the new food for English dairy cattle—ensilage—is a point upon which the evidence is as yet very contradictory.

OTHER CAUSES AFFECTING MILK SUPPLY.

It is believed by some that the time at which milking takes place, whether morning or evening, makes a difference in its quality, morning milk being supposed to be better than evening. This, however, depends rather upon the nature and quantity of the food given some few hours before milking, and also upon whether the cows have been allowed to be quiet and undisturbed, than upon any difference of time. Milk, as it is being obtained from the cow, is not of uniform character, for already in the udder the cream has begun to separate, and the portion first drawn off is very poor, and contains but little cream, but the last portion is very rich and contains most cream: hence, it is an important point to drain off all the milk thoroughly, and the inefficiency of any milking-machine as yet constructed to do this thoroughly has prevented their taking the place of milking by hand.

The time of the year has a further bearing upon the quality and quantity of milk. It is most abundant in spring and early summer; diminishing after that in quantity, it becomes richer in quality.

Lastly, as has been observed in passing, the date of calving influences the supply of milk considerably, it being most plentiful ten or twelve days after calving, when the colostrum disappears, and, after about two months, beginning to diminish till about the ninth month, when the cow generally runs dry. On farms where milk-supply is the chief concern, it is so arranged that the cows shall calve all the year round, and not all at one particular period, or they would also be all dry at the same time. The calves in these cases are at once taken away from their mother and brought up by hand, or by nurse-cows, which are very often Herefords.

ANALYSIS OF MILK.

Having now dealt with the cattle that yield our milk-supply, and the various causes which affect the quantity, quality, and regularity of this supply, I come next to treat, in detail, the composition of milk, analytically and quantitatively, to show, in fact, in what varying proportions the constituents which we have hitherto considered only qualitatively exist in milk.

The following table gives the composition of four different samples of milk obtained from the cow, and analyzed by Dr. Voelcker:

Composition of New Milk.

Water,	83.90	85.20	87.40	89.95
Butter,	7.62	4.96	3.43	1.99
Casein,	3.31	3.66	3.12	2.94
Milk-sugar,	4.46	5.05	5.12	4.48
Mineral matter, (ash,)	.71	1.13	.93	.64
	100.00	100.00	100.00	100.00
Percentage of dry matter,	16.10	14.80	12.60	10.05

The two last columns are analyses which have been already referred to as the milk of cows belonging to the Cirencester College herd, and fed in September on grass, scanty in supply, and in November fed altogether indoors on roots, cake, straw-chaff, &c. The other two were milks from a dairy in the neighborhood. Taking these four milks, all of which were perfectly genuine samples, it is clear that the possible range between the highest and lowest percentages of water and of butter-fat is very considerable, while the remaining constituents—casein, milk-sugar, &c.—do not fluctuate to any important degree. According to the standard at present adopted by our public analysts, the last-mentioned milk would be condemned as adulterated milk; nevertheless it was obtained direct from the cow, without having been in any way tampered with. On the other hand, the milks in the first two columns are exceptionally rich in fat, and have comparatively small percentages of water; while that in the third column is an instance of a milk which contains butter-fat and water, in proportions frequently met with in the case of ordinarily well-fed and cared-for dairy cows. From a host of analyses made of milk, all perfectly genuine, we may generalize so far as to say that the percentage of water may range in individual cows from about eighty-four to ninety per cent. to seven per cent., though cases may still occur of genuine milk falling outside either limits. After the removal of water by evaporation of the milk to dryness over a water-bath, there is left a solid residue, the proportion of which, when obtained by accurate weighing after drying in a water-bath until there is no further loss, is called the proportion of "total solids," and includes every constituent except water. This is further resolved into two portions, called respectively "fat" and "solids not fat." Fat is distinguished from "solids not fat" by its solubility in ether; and by treatment of the residue with ether the fat is separated out and estimated, the solids "not fat" comprising casein, milk-sugar, and mineral matters. By igniting the dry residue after milk has been evaporated, the mineral matters alone are left as a white ash, called "the ash of milk." A substance which so readily mixes with water as milk does is easily adulterated, both by it and by the abstraction of cream. Practically, water is the only adulterant used, though it will be long, I expect, ere the British public will give up its belief that such substances as calves' brains, starch, chalk, &c., are frequently added to milk.

It is highly important to secure the supply of pure and unadulterated milk to the consumer, and the analytical chemist must be prepared with the means of detecting any adulteration, and of deciding upon the quality of a sample of milk submitted to him. The means at hand are two-fold; the first class are those which only give a guidance to the forming of a conclusion as to the purity of a sample of milk; the second class are the methods of ultimate analysis. These we shall proceed to consider—first, the determination of the specific gravity. This is done either by means of the specific-gravity bottle, or by simply immersing a lactometer in the milk.

INSTRUMENTS FOR TESTING.

Taken alone, the specific gravity is no decisive test of the quality, for, cream being lighter than milk, if a large quantity of cream is present, the gravity is lower, and if cream has been taken off and water added, the gravity is also lowered, so that from this alone it would be impossible to say whether the milk was rich in fat or if water had been added to it. As a rough guide, however, the lactometer has its uses, and inspectors under the "sale of food and drugs" act are duly provided with these instruments. For estimation of the percentage of cream, milk is poured into a 100 c. c. measure, and allowed to stand twenty-four hours. The quantity of cream thrown up in this way, however, is not a safe indication of the quality of milk, as some milks, though rich in butter-fat, do not throw up much cream.

The amount of agitation to which the milk has been subjected is also of much account, since, if the globules be much shaken and broken up small, they will hardly rise to the surface at all. There are several optical methods for arriving at the conclusion about the quality of milk, among them Feser's "Lactoscope" and Hereen's "Milk-Controleur."

The percentages of fat and non-fatty solids have further been attempted to be arrived at, not by actual analysis, but by calculations from the specific gravity and total solids by the aid of a formula.

I will not enter into the details of the methods of determining by regular analysis the quantities of the various constituents—water, fat, casein, milk-sugar, and ash—but confine myself to a few remarks only, and then to pass on to points of more general interest. In the determination of water, by evaporating a weighed quantity of milk to dryness, and heating it to 100° C. in a water-bath, it is absolutely necessary that the residue should be kept at this temperature until its weight is perfectly constant; and it is not sufficient to leave it in the bath and weigh it after three hours, according to Wanklyn's method. I have met with a large number of cases where a milk residue has continued to lose water for more than a whole day, and if all the water has not gone off within three hours, how can such a plan accurately represent the percentage of water? For the extraction of fat, ether is the solvent employed, though different modes of using it are in vogue. Doctor Bell, of Somerset House, obtains the dry residue from about ten grains of milk in a platinum crucible, and this with ether, repeatedly, breaking up the mass each time with a glass stirrer. Another plan is Soxhlet's apparatus. Into this either the dry residue is put; or others, instead of employing the dried residue, take the milk as it is, mix it with calcined gypsum, evaporate it a short time on a water-bath, and then put the whole in the Soxhlet's apparatus. My own plan is, after obtaining the dried residue at 100° C. in a flat porcelain dish, to carefully scrape it all out, and pound it finely in a flattish agate-mortar, the smooth surface of which prevents any particles adhering to it or clogging it up, as would be the case with stoneware, after which I transfer it to Soxhlet's apparatus, obtaining, by the repeated washing of the finely-divided substance by the solvent, a more complete separation of fat than by any maceration process.

The lacto-butyrometer is a ready and fairly accurate instrument to determine the quantity of fat. In this method the fact of the ether and alcohol being of the exact strength required is a *sine quâ non*, or the results are not correct. For their guidance in deciding upon whether to report upon samples of milk as being pure, or as adulterated with water, or having had the cream removed, public analysts have fixed upon certain figures, viz: nine per cent. of "solids not fat," and two and one half per cent. of "fat," and have decided that any milk giving results higher than both these shall be considered pure, but if lower than either, adulterated. Considerable discussion has been raised upon this, and it has been clearly shown than the nine per cent. "solids not fat" is too high for a minimum, while two and one half per cent. of fat as a minimum is, on the other hand, lower than the quantity of fat the public may reasonably expect to be supplied with, while it opens the door to milk-dealers removing some portion of the cream while still keeping within the standard of the public analysts. Dr. Voelker showed that in the case of cows entered at the different yearly dairy shows in London, and milked in his presence, the samples being taken by him at the time, a very considerale number gave an analysis less than nine per cent. of solids not fat, and would have been condemned as adulterated if the standard of the public analysts had been adhered to. Three out of the last four samples of milk analyzed at the laboratory of the Royal Agricultural Society of England have similarly come below the standard, though the percentages of fat were 3.30, 3.62, and 4.46, and the cows were being fed on cake, hay, &c. A fair average would appear to be, "solids not fat," eight and one half per cent.; fat, three per cent.; water, eighty-eight and one half per cent.; and a modification in this direction, which, indeed, is tacitly employed by several analysts, is without doubt needed. The danger of fixing any standard at all is that, if it be a low one, there is the inducement to dilute high quality milk to the standard, and so make it go farther; while if the standard be high, there is the fear of doing injury to an innocent man who sends out milk as it comes from the cow, but poor in quality. On the whole, however, the public have a right to be served with milk of good quality, and three per cent. of fat is not too high for an average. An instance lately came under my notice of a farmer who was under contract to supply a certain quantity of milk daily, and when his cows gave a poor and insufficient supply, he was in the habit of using condensed milk, which he purchased, with a recipe for mixing it with water in such proportions as to come within the public analyst's standard. Unfortunately for him, however, the condensed milk he purchased had itself a considerable quantity of water, and the mixture, when made, was too poor to pass the standard.

COMPOSITION OF CREAM.

Milk skimmed in the ordinary way contains from three fourths to one per cent. of fat. At the Kilburn show of the Royal Agricultural Society of England, in July, 1879, there was introduced DeLaval's centrifugal cream-separator, with which trials were made, and Dr. Voelcker, in reporting on them, showed that, instead of leaving three fourths to one per cent of fat in the skimmed milk, this separator left less than one fourth per cent. of fat. The use of such a separator at once became a matter of much moment to dairymen and also to the public, for, instead of letting milk stand and get sour by the time the cream is removed, leaving an unsalable milk behind, the cream can be separated perfectly fresh; a better price is obtained for butter, which is all the better the sweeter the cream is from which it has been produced, while, to the poorer classes, it must be a great boon to be able to get a perfectly good and nutritious food at the low price of about four pence per gallon,—a food which is especially valuable for the children in the town or country, either used as a beverage or in the shape of rice, sago, tapioca puddings, or similar easily-digested foods, composed mainly of milk and farinaceous substances. At Mr. Tisdall's dairy, if necessary, first-class fresh butter can be produced from cream separated by DeLaval's centrifugal machine two hours after milking.

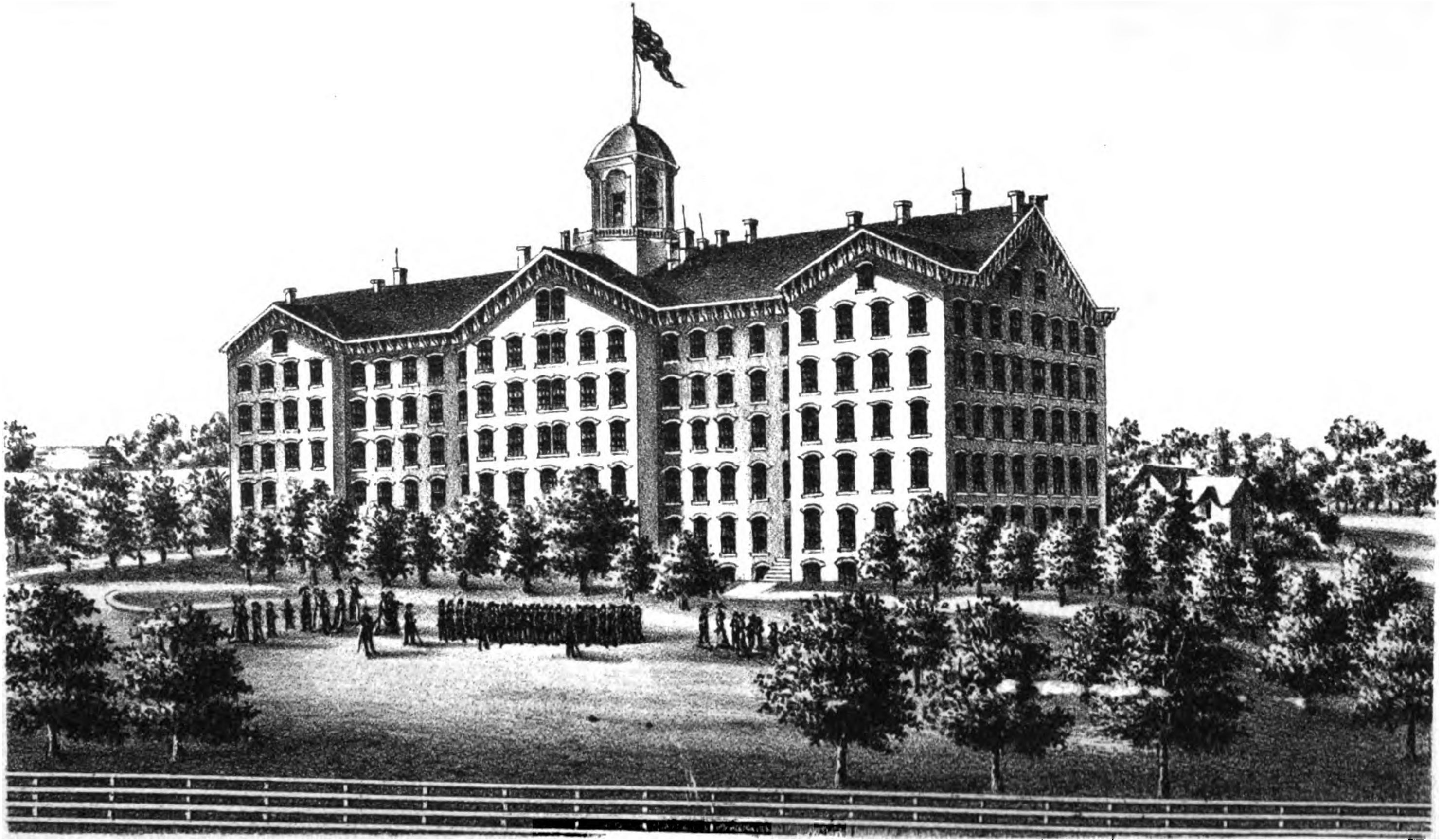
KEEPING QUALITIES OF MILK.

In conclusion, allow me to offer a few remarks with regard to the keeping qualities of milk, and the sanitary aspect of the milk trade. Clean hands for the milkers, sweet and clean milk-pails and cans, and, generally speaking, scrupulous cleanliness in and about a dairy or the establishments of milk-dealers. I need scarcely say, more than anything else, prevent the milk from getting sour.

An essential point in keeping milk sweet for a reasonable time, even in warm weather, is to pass the milk, directly it comes from the cow, through a cooling-apparatus, like that of Lawrence, allowing the milk to flow over a series of tubes, through which a stream of cold water passes. By this means the natural temperature of about 90° F. can be reduced to about 60° or 65° F., and when once cooled down, or, as the farmers say, the "natural" heat having been taken out at once, the milk will keep much better, even if the temperature rise afterwards considerably. This leads me to remark on the great utility of a supply of perfectly wholesome and cold water. Water, even if used for washing milk-pails, when contaminated with sewage or house-drainage, it is well known, is most inimical to the keeping qualities of milk, and, moreover, may be, and not unfrequently is, a direct carrier of infectious diseases, as well as the milk supplied from farms or dairies where typhoid fever, scarlet fever, and other infectious diseases have broken out. It is to be feared that our sanitary regulations, as regards dairy farms, milk-shops, &c., are not as efficiently carried out as the interests of the community demand. It is fortunate that milk from unhealthy cows, or milk contaminated with impurities of any kind, does not keep a reasonable length of time, and this gives us a means of distinguishing, in a rough-and-ready way, wholesome milk from milk of doubtful character. For this reason, I strongly object to the use of such substances as salicylic and boracic acid, or any other chemicals, more or less efficacious, in preventing milk from turning sour. The less milk is tampered with, and the less chemistry or the pump or the cream-skimmer have to do with it after it has left the cow, the greater the prospect of the public being supplied with a wholesome, rich, and unadulterated food.

INDEX.

Page.
Address by the President, 5
Bogus Butter Sophistries Answered, 78
Constitution, 2
Cream Gathering in the West, 63
Does it Pay to Improve our Stock? 72
Farmers' Institutes—The Good and Bad Features of Dairying in Ohio, 8
Farmers' Clubs, 49
Future of Dairying in the West, 46
Home-dairy Butter-making, 61
Improve your Dairy—When, How, and Why, 57
List of Officers, 1
Milk, 82
Milk Production, 80
Pleuro-Pneumonia, 65
Report of Auditors, 4
Report of Secretary, 4
Report of Treasurer, 3
Selecting Dairy Cows, 71
Sour as well as Skim Cheese gets Left, 67
Swedish Method of Butter-making, 68
The Future of the Jersey Cow, 55
The Relation of Food to Milk Production, 34
Winter Dairying in the West, 62



PENNSYLVANIA STATE COLLEGE.

Legislative Document, No. 4.

ANNUAL REPORT

OF THE

PENNSYLVANIA STATE COLLEGE,

FOR THE YEAR 1885.

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DESCRIPTION OF THE INSTITUTION.

The Pennsylvania State College

Was organized in 1859 as the "Farmers' High School," and its object then was to give an exclusively agricultural education. Its organization, however, was upon a collegiate basis from the beginning; and its name was, in 1862, changed to "The Agricultural College of Pennsylvania." Subsequently, the Legislature of the State having appropriated to this institution the income from the proceeds of the National land-grant, and the scope of its work having thus been necessarily enlarged, its name was, in 1874, again changed, and it has since been known as "The Pennsylvania State College." This name is considered to have peculiar fitness, both on account of the intimate connection of the College with the State Government and because the benefits of the National endowment were designed and are administered in behalf of the people of the whole Commonwealth.

The scope of the institution, as now organized, cannot be better stated than in the comprehensive words of the acts of Congress itself, defining the duty ot this and similar colleges:

"The leading object shall be, without excluding other Scientific and Classical Studies, and including Military Tactics, to teach such branches of learning as are related to Agriculture and the Mechanic Arts, in such manner as the Legislature of the State may prescribe, *in order to promote the liberal and practical education* of the Industrial Classes *in the several pursuits and professions in life.*

This act of Congress was, in 1863, "accepted by the State of Pennsylvania, *with all its provisions and conditions*, and the faith of the State * * * * pledged to carry the same into effect."—*Laws of 1863, p. 214.*

Based upon this broadened foundation, the special work of the State College is INDUSTRIAL EDUCATION; that is, the training of youth in those branches of learning which lie at the foundation of modern industrial pursuits. In accordance with the purposes of its founders and the terms of its original charter, it aims to give special and prominent attention to Agriculture, both theoretical and experimental. But it also provides a "liberal and practical education" in the leading branches of mathematical, natural, and physical Science, in order to prepare youth for "the several pursuits and professions in life," as the laws of Congress and of this State distinctly require. In other words, while the College is no longer exclusively agricultural, it is doing more in the direction of progressive and scientific Agriculture than when that was its principal object; and, at the same time, it has increased its subjects and courses of study, and its teaching and illustrative equipment, to such an extent that it is now a well-organized Scientific Institution, or College of Technology—"without excluding classical studies"—aiming constantly to teach the various sciences in such a manner as to show their applications in the more important industries, and thus to combine theory with practice. Such a course of training, aiming to cover even a part of the vast field of modern scientific knowledge, must necessarily be somewhat prolonged.

But its results are showing themselves, in a most gratifying way, by the readiness with which our graduates from the technical courses find honorable and remunerative employment.

The range of work is shown, as far as the limits of space properly allow, in the following schedules and descriptive statements; and the attention of those who are interested in scientific studies, either as a system of higher education, or as a means of preparation for active life, is cordially invited to the extensive facilities here offered.

It is confidently believed that few, if any, institutions in the country furnish opportunity for obtaining an advanced scientific education, of equal extent and thoroughness, at so moderate a cost, and with so many incidental advantages.

LOCATION.—The institution is situated in the village of State College, Centre county, nearly twelve miles south-west of Bellefonte, and about equi-distant from the extreme parts of the State. Its position in the midst of a broad, rolling valley, with Muncy mountain on the north, Tussey mountain on the south, and Nittany on the east, secures a varied and remarkably beautiful landscape and a healthful climate.

A special act forbids the sale of intoxicating drinks within two miles of the College, and all its surroundings are exceptionally free from demoralizing influences, and from temptations to extravagance.

The main College building is a plain and substantial structure of magnesian limestone, two hundred and forty feet in length, eighty feet in average breadth, and five stories in height, exclusive of attic and basement. It contains the public rooms—such as chapel, library, armory, cabinets, laboratories, society halls, and class-rooms—and a large number of dormitories. The building is heated throughout with steam, one or more upright radiators being placed in every room, hall, and passage-way, and is furnished on every story with an inexhaustible supply of pure water from an artesian well. The sewerage system is frequently and carefully inspected, and the unusual exemption of our students from every form of sickness justifies the statement that the sanitary condition of the building is very nearly perfect.

CAMPUS AND FARM.—The tract of land on which the building stands contains nearly three hundred acres. Of this, about fifty acres in the immediate vicinity of the building constitute the campus, and furnish recreation grounds, sites for the professors' houses, and other needful buildings, &c. The campus contains, at present, several of these residences of professors, and is tastefully laid out and adorned with trees, shrubbery, flower-gardens, and walks.

PRACTICAL TRAINING.—The College has, from the first, sought to combine practical with theoretical instruction, and thus to fix in the student's mind a knowledge of both methods and principles. With this end in view, a portion of each student's time has been set apart for this training, and the number of subjects in which such instruction is given, and the apparatus for it, have been added to until it covers an extensive range of topics, as will appear from an examination of the several schedules. A portion of this training is largely technical, and so is almost wholly confined to certain courses. Other parts, however, are so general in their character as to be appropriately required of all students. Among these practicums taken by all the students, without reference to the particular course of study they may be pursuing, the following may be mentioned for the sake of illustration: *Book-keeping*, so important for the right conduct of all business; *Drawing*, free-hand and mechanical, needed by individuals in all employments and professions; *Military Drill*, required by the law of Congress, and helpful in securing right habits of mind and body; *Mechanic Arts*, in which are learned, among other things, the making of plane surfaces, correct angles and joints, and the care and use of tools; *Horticulture*, where instruction is given in all ordinary operations belonging to fruit-culture, such as pruning, grafting, budding, and propagation by cuttings and layers;

and *Surveying*, which acquaints the student with the instruments of the art, and trains him to determine points, distances, and areas. Some of these practicums not only give knowledge of almost universal use, but also serve a good purpose by developing, during the early part of the course, tastes and aptitudes which may determine the student's choice of a technical course and of his life-work.

In the Technical Courses, special lines of practice have a large amount of time given them, proportionate to their importance, or looking to subsequent professional use. Each practicum is directed by an instructor who is familiar with both the theory and the practice, and with their mutual relations. The instruction is so largely personal that an earnest student may advance far beyond the average attainments required as a minimum. The experience of the College adds, from year to year, to the evidence that this training is highly valuable, and in directions which no one can foresee, even when the pupil does not, at the time, fully appreciate its importance.

COURSES OF INSTRUCTION.

The organization of the College is such that the instruction given naturally falls under several departments, which are distinct, and yet so mutually related as to form, when combined in groups, well-proportioned, systematic, and progressive Courses of Study. The number of such courses is now seven, viz: A General Science Course, a Latin-Scientific Course, a General Course in Agriculture, and four Technical Courses, designated as Courses in Agriculture, Chemistry and Physics, Civil Engineering, and Natural History, respectively. The studies in the four Technical Courses *are the same, for the first two years*, as those in the General Science, or the Latin-Scientific Course, at the option of students.

All students, accordingly, who intend taking a regular course, enter the General Science Course, or the Latin-Scientific, at the beginning of the Freshman year, continue its studies until the end of the Sophomore year, and then either complete one of these courses or select that one of the Technical Courses which prepares directly for their chosen work. The studies of the first two years are so arranged as to form a course by themselves, especially adapted to meet the wants of those who cannot take the four years' course, but who desire to fit themselves well as land surveyors, or for any of the ordinary callings of life, at the same time acquiring a fair degree of liberal education.

Students leaving at this period of their course receive from the Faculty a Certificate of their attainments.

Besides the regular courses, of four years each, there are provided a three years' course in Mechanic Arts; distinct Special Courses, of two years each, in Chemistry and in Agriculture, and a Course of the same length in Literature and Science, which is especially designated to meet the wants of young ladies. In this Course ample facilities in music are also provided.

The character of the several Courses may be briefly indicated as follows:

I. GENERAL COURSES.

I. The General Science Course.

The Course in General Science may fairly be taken as representing the best average of work and of results among all the college courses. It is designed to meet the wants of those who desire to obtain a sound and liberal education through the study of the mathematical, physical, and natural Sciences, and Modern Languages and Literatures, rather than the Ancient Classics. It provides a thorough training in Mathematics and Physics, (with the option of the Calculus in the Junior year,) a sufficient acquaintance with the leading branches of Natural Science, (as Chemistry, Botany, Geology, &c.,) and as much study of Mental, Moral, and Political Science as is found in the usual college course, while the literary studies include an extensive reading of French, German, and English Literatures and iterary history. No student can fairly complete this course without having acquired a stock of recent knowledge and a degree of intellectual training which will fit him to enter successfully upon any chosen career and furnish an admirable and affective equipment for the duties of American life and citizenship.

2. The Latin-Scientific Course.

This course is nearly the same as the General Science Course, with the substitution of Latin, for the first five terms, in place of other studies. The course is shown in full in the schedule of studies. While the instruction in Latin is not so extensive as in institutions in which classical studies are allowed to take the leading place, it is given with equal thoroughness and breadth, and is sufficient, both as an instrument of mental training and as an acquisition of learning, for all the needs of ordinary college students.

II. TECHNICAL COURSES.

1, 2. Courses in Agriculture.

In this subject two courses are provided. The object of the first course is to *educate* young men thoroughly at the same time that they are carefully instructed in the relations that the sciences bear to the various branches of agriculture; to give both the mental training that is indispensable to success, and the scientific and technical knowledge requisite for becoming efficient workers in agricultural directions, whether as practical farmers, teachers, or investigators. Any lower aim would fail to meet not only the requirement of the laws under which the College is organized, but the progressive demands of the time.

To this end the State College offers to the students of agriculture something more than the meager advantages of a manual labor school, on the ground that otherwise the desired objects could not be reached, and that it is both useless and unjustifiable for a young man to incur the expenses of a college course in order to acquire the manual dexterity that could be secured with little cost elsewhere, and which every farmer's son obtains early in life. The aim of the courses in agriculture is to teach how the principal branches of physical and natural science are applied to the business of farming, and to afford a thorough and comprehensive knowledge of its principles and methods. They explain the nature of soils and of manures, the reasons for and the best methods of tillage, the constituents and characteristics of plants and animals, and the conditions favorable to their development. Practice is combined with theory wherever the processes involve skilled labor; but the student's time is not consumed in the mere manual operations of plowing, planting, and feeding.

It is evident to all who take a broad view of the relations and necessities of the farmer's calling that the pressing need of to-day in order to build up a more rational and profitable system of farm practice is not a greater proficiency in mere hand-work, but a larger knowledge of underlying facts and principles. This knowledge (now eagerly sought after by the intelligent agricultural public, and to which present progress in farm practice is due) is largely contained in the records of scientific investigation, and is to be secured at college chiefly in the class-rooms and laboratories. To be of value, *it must be something more than a mere smattering of ideas.* It must be a thorough, systematic, and accurate acquaintance with underlying facts and principles. The four years devoted to the study of the sciences and their applications to agriculture is but scant time for the acquisition of the necessary knowledge, and manual labor should be required of the student only so far as it can be made an efficient adjunct of the class-room and the laboratory instruction.

The studies of the first two years of the advanced course include Mathematics. Surveying, the general principles of the sciences, the Modern Languages, and Rhetoric, with Latin for those who desire it. The direct application of science to agriculture, and the consideration of purely technical subjects, are reserved for the last two years, after the student has gained a sufficient basis of general knowledge. Instruction is given with the use of text-books, whenever suitable ones are available, but in some cases the subjects are, of necessity, presented by lectures.

2. In order to meet the wants of students who desire to begin the study of Agriculture immediately after leaving the public schools, a four years' course has been organized, for admission to which a knowledge of the common English branches only will be required.

PRACTICUMS.—It is intended that the management of the College farms shall be such as is sanctioned by the teachings of science and practice. Of this management, in its various details, the students of the course in agriculture are to be observers, taking part in actual labor to the extent that is necessary for proper observation. The object of the practicums will, in all cases, be to secure from the student a report of the operations coming under his notice, with discussion of the principles and a criticism of the methods involved.

The facilities for becoming familiar with the growing of the ordinary farm crops, the use of commercial fertilizers, the manufacture and use of farm manures, and the feeding of animals for the production of meat and milk, are now entirely adequate for ordinary instruction. When the improvements now planned to be made at an early date are secured, such as additions to the farm machinery, the building of a model dairy, and the establishing of a herd of thorough-bred animals, the opportunity for making a study of correct farm practice will be such as cannot fail to benefit any one intending to adopt agriculture as a calling.

3. Course in Chemistry and Physics.

The instruction in this course is designed for those who wish to become practical or professional chemists or physicists, as teachers and investigators, or as metallurgists, or manufacturers in chemical industries; or for those who wish to pursue medicine, pharmacy, mining, and similar professional or industrial occupations.

The extensive and well-equipped laboratories afford ample opportunities for qualitative and quantitative work in both chemistry and physics; they enable the student of physics to verify the action and laws of physical force, the assayist to determine the value of ores, and the agriculturist to ascertain the composition of his organic products. Probably no two subjects of scientific study are intimately connected with so wide a range of modern industries as those which make up this course. During several terms past, more than usual attention has been given, in the department of Physics, to the recent important development of electrical science and its extensive practical applications.

4. Course in Civil Engineering.

The object of this Course is to give thorough instruction in the studies and practical work pertaining to the profession of Civil Engineering. The same studies, to a considerable extent, are necessary to the architect also, and to the mining or the mechanical engineer; and are valuable to any who desire proficiency in the applications of mathematics or physics. The work of the Course is so arranged that its graduates may become thoroughly familiar with the theory and practice of field operations, the use and care of instruments, and the work of the drawing-room; and to enable them, through systematic training, to establish a sound basis for future usefulness and success in the higher branches of the profession, or to follow out any of its specialties. The harmony between theory and practice, and their mutual dependence, is dwelt upon in order to develop the power to think, as well as the ability to execute. To this end, experimental as well as rational methods are habitually introduced; as, for instance, while studying the principles from which the resistance of materials is deduced, the student verifies them by experiment in the work-shop. And in like manner, at every stage of the work, the applications of principles are taught as second in importance only to a thorough knowledge of the principles themselves.

5. Course in Natural History.

The design of this Course is to give a practical knowledge of Geology, Zoology, Botany, &c., to furnish a preparation for medical studies, and to train its graduates for the work of collecting and classifying objects in Natural History, and for the superintendence of Scientific Explorations and investigations. Many of the studies belonging particularly to this Course enter largely into the Agricultural Course also, and into the General Science and Latin Scientific.

Instruction is derived not only from the text-books and lectures and the work in the laboratories, but from the study of the various collections, and from excursions in the vicinity of the College, the surrounding district being especially rich in material illustrative of Geology and Botany.

III. SPECIAL COURSES.

1. In Agriculture. 2. In Chemistry.

These short Special Courses, of two years each, are designed to afford to those who, for any reason, are unable to take a full course, opportunity to acquire a practical working knowledge of some of the leading facts, principles, methods, and applications of the more important branches of Natural Science. Students in these Courses are expected to devote more than the usual proportion of time to laboratory and other technical practice; and thus to compensate for shortness of time by increased diligence. Only so much of other studies is introduced as is requisite to secure full employment of time and some moderate degree of general cultivation. The Courses are shown in detail in the schedule on a subsequent page. Students completing either of the Courses receive a special certificate.

3. Mechanic Arts.

Combining shop-work and study.

This course was begun about four years ago, but has lately been re-organized and greatly extended. During the past year, a new and substantial frame building, two stories high, has been built, and equipped with a good supply of the best modern tools and machinery, and the department has now excellent facilities for giving the successive grades of training. It is designed to afford such students as have had the ordinary common-school education an opportunity to continue the elementary scientific, and literary studies, together with mechanical and free-hand drawing, while receiving theoretical and practical instruction in the various mechanical arts. The instruction in shop-work is given by means of exercises so planned as to cover, in a systematic manner, the operations in use in the various trades.

The object of the course being to give instruction in the use of tools, only such constructions are made as cover principles without undue repetition. The first instruction in carpentering and joining is in the use of the saw and plane in working wood to given dimensions; and a series of elementary exercises follow in order, such as practice in making square joints, different kinds of dove-tails, the various tenons, roof-trusses, panels, &c. The instruction in turning and circular-section pattern-making is given from a series of models; also bench-patterns are made for subsequent use in the foundry.

The foundry course consists in casting from the patterns which the student himself has previously made. Many of the pieces cast from these patterns are used in his clipping and filing work.

In the forge shop are taught the management of the fire and the degree of heat necessary to forge the different metals. Drawing, forming, bending, upsetting, fagoting, splitting, punching, chamfering, annealing, tempering, case-hardening, &c., are taught by means of a series of exercises in which the elements of the iron-forger's art are particularly dwelt upon. Every piece is made to certain dimensions laid down upon the drawing, the article being forged before the class by the instructor, who directs attention to the essential feature of the operation, which is then repeated by each student. The course in vise-work includes filing to line, filing to template, free-hand filing, fitting, and chipping straight and grooved surfaces in cast-iron, wrought-iron, and steel. In the machine-shop the student, after having the lathe and its mechanical construction explained to him, is taught centering, tape-turning, chucking, reaming, inside and outside screw-cutting, bolt-turning, &c. He is then required to construct some piece of mechanism in which many of these principles are involved.

Some may think that the variety of operations in the mechanic arts is so great as to make it impossible to give the student any real knowledge in the time at his disposal. It should be borne in mind, however, that this multiplicity of processes may be reduced to a small number of manual operations, and the numerous tools employed are only modifications of, or convenient substitutes for, a few tools which are in general use. The uses of the lathe are, to a great extent, the same, whether the material is bone, metal, or wood; whether the moving power be derived from the workman's foot, from a water-wheel, or from a steam-engine. Again, as fitting depends on a correct eye and manual skill, he who has learned to fit in metal by means of the clipping-hammer and the file, will not long find difficulty in fitting wood by means of the saw, the plane, and the chisel. Mastery over a few processes and a few tools of universal application, acquaintance with the methods of fitting and finishing, and with the ordinary means of transmitting and converting power, are then the essential points embraced in this course.

The Drawing of this course extends through the entire three years. This work is looked upon as of the highest importance, and the effort is to make the instruction thorough, practical, and of direct utility. Considerable time is devoted to free-hand drawing, as it is believed that it not only assists in mechanical drawing, but is of great service in after years, whatever the occupation.

The mechanical drawing consists of a series of exercises, and such are selected as will be of subsequent use. They are arranged in progressive order, beginning with geometrical constructions involving straight lines and circular arcs only, and ending with the more complex curves, such as the ellipse, helix, epicycloid, &c. Projection is next taken up. The instruction in this is from models, so that the student may have before him the actual object from which the projection is made, and not be obliged to depend upon his unaided conception. After completing this work, he is required to draw parts of machines from actual measurements. For this purpose he is given some piece of mechanism to sketch and measure, and of which, finally, he is to make complete working-drawings.

In Mathematics, the instruction covers Algebra, Plane and Solid Geometry, Plane and Spherical Trigonometry, Land Surveying, and Mechanics, taught with special reference to this class of students, many practical applications being made. Candidates for this course must be at least fourteen years of age, and pass a satisfactory examination in the following subjects: Robinson's Complete Arithmetic (or its equivalent) to ratio; English Grammar (Syntax and Etymology;) Geography and Spelling. The following table gives the course of study and shop-work in detail:

YEARS.	Session.	STUDIES.	Hours per week.	PRACTICUM.	Hours per week.
FIRST YEAR.	Fall.	Algebra, Arithmetic, English Analysis,	4 4 5	Carpentering, Drawing,	4 5
	Winter.	Algebra, English Composition,	5 5	Carpentering and joining, Drawing,	8 5
	Spring.	Algebra, English Composition, Book-keeping,	5 5 5	Wood-turning, Drawing,	6 4
SECOND YEAR.	Fall.	United States History, Algebra, Physics,	5 5 5	Pattern-making, Drawing,	4 4
	Winter.	Geometry, Algebra, Physics,	2 4 5	Foundry work, Drawing,	6 5
	Spring.	Geometry, Mechanics, English History,	5 2 5	Forging, Drawing,	6 8
THIRD YEAR.	Fall.	Algebra, Geometry, Mechanics,	3 3 4	Forging, Drawing,	6 9
	Winter.	Geometry, Trigonometry, Rhetoric,	3 3 4	Vise work, Drawing,	6 9
	Spring.	Trigonometry and Surveying, Mechanism,	5 3	Machine tool work, Drawing,	9 9

4. Ladies' Course.

Young women are admitted to all classes, in all Courses, on the same terms as young men. But a separate course has been established, containing more of the branches of study that are thought likely to be especially serviceable to them, with less extended requirements in Mathematical and Scientific studies. Parents who send their daughters to the College may rely upon their being surrounded by kindly and healthy influences, under the direction of a competent lady principal.

Young ladies not residing at their own homes occupy rooms in the portion of the main College building set apart for their use, either taking their meals with the boarding club or combining in groups to board themselves, facilities for that purpose (and some slight aid) being provided by the College. Table board can be obtained for them, when desired, in excellent private families.

The requirements for admission to this course are the same as for the General Science Course. The studies are as follows:

FIRST YEAR.

FALL SESSION—German (5), French (3), History (4).
Electives—Algebra (3), Chemistry (4), Latin (4). Geometry (3).
Practicum—Free-hand Drawing or Music.
WINTER SESSION—German (5), French (3), History (2), Rhetoric (4).
Electives—Chemistry (4), Geometry (3), Trigonometry (3), Latin (4).
Practicum—Mechanical Drawing or Music.
SPRING SESSION—German (5), French (3), History (2).
Electives—Trigonometry (5), Physiology (3), Chemistry (3), Latin (4), English Literature (4), Botany (4).
Practicum—Industrial Drawing and Designing, or Music and Botany.

SECOND YEAR.

FALL SESSION—German (2), French (2), Botany (4), English Literature (4).
Electives—Higher Mathematics (4), Geology (4), Logic (3), Political Economy (4), Latin (3).
Practicum—Botany (or Geology for such as elect that study,) and Music.
WINTER SESSION—German (2), French (3), History of Civilization (4).
Electives—Higher Mathematics (4), Zoology (4), Constitutional History (4), Geology (2), Astronomy (3), Latin (3), Butler's Analogy (4).
Practicum—Botany or Geology or Zoology for such as elect either of those studies, and Music.
SPRING SESSION—English Literature (4), Mental Philosophy (4), Ethics (4.)
Electives—Astronomy (3), Zoology (2).
Practicum—Music.

IV. PARTIAL COURSES.

Students of mature years, and younger students whose parents or guardians request it, are permitted to choose (among college studies, but not preparatory) such special course as they may need. Such students must be prepared to enter upon and pursue with profit the studies chosen. They are required to have the same number of hours of class-work as other students, and to take part in the practicums to which they are assigned. Subject to these requirements, and to the ordinary discipline of the College, any person is at liberty to select from the entire range of studies such branches as he may wish to pursue, and for such length of time as he may find convenient, the purpose of this arrangement being to bring the advantages of the Institution as fully as possible within reach of every young man and woman in the State. Students are earnestly advised to enter one of the Regular Courses, and pursue it systematically to the end; but in cases where that is not feasible, IT IS INTENDED TO MAKE THE STATE COLLEGE, TO THE FULL EXTENT OF ITS RESOURCES, A PLACE WHERE ANY PERSON MAY OBTAIN THAT KIND AND DEGREE OF EDUCATION WHICH IS MOST DIRECTLY SUITED TO HIS CIRCUMSTANCES AND PURPOSES IN LIFE.

To those who satisfactorily complete one year or more of such special work, certificates, under the seal of the institution, are given, setting forth the studies which they have pursued, and their proficiency therein.

GENERAL STATEMENTS.

1. Degrees.

The degree of Bachelor of Science is conferred upon graduates of all the four years' courses. The diploma given to graduates of the technical courses contains mention, also, of the special line of technical work pursued.

The degree of Master of Arts, or Master of Science, is conferred upon graduates of the State College, of at least three years' standing, who are known to have been systematically pursuing scientific, literary, or professional studies, and upon graduates of equivalent courses in other institutions, who have, satisfactorily to the Faculty, studied at least one year in the graduate courses. Higher degrees, such as C. E., Ph.D., D. S., &c., are only conferred at the end of prescribed courses of advanced study, or in recognition of high professional attainments.

2. Graduate Instruction.

Persons who have been graduated in one of the above regular courses, or an equivalent course elsewhere, are permitted to enter the college for instruction in an advanced course, consisting of such studies as may, in view of the circumstances of each case, be approved by the faculty.

3. Libraries and Reading-rooms.

The library belonging to the College has about four thousand volumes, embracing scientific and technical works, memoirs, scientific essays, agricultural and educational works, &c., in English, French, and German, forming the nucleus of a fine scientific library. From four to five hundred volumes per year are being added.

The reading-room in connection with the College library offers to Faculty and students an ample and well-selected list of scientific and other periodicals.

Donations of books and periodicals are invited from friends of the institution, publishers, and authors.

Each of the two students' literary societies has a good library of standard and miscellaneous works, and a reading-room supplied with the principal literary periodicals and newspapers of the day.

4. Free (Senatorial) Scholarships.

There have recently been established by the Trustees fifty scholarships, one for each senatorial district in the State, entitling the holder to *exemption from all College charges*, (except for materials used in the laboratories,) in any of the regular college courses. The scholar, male or female, is to be appointed by the Senator of the district, after a competitive examination in the studies required for admission to the Freshman class. No person is eligible as a candidate who has previously been admitted to any class in the College.

The holder of the scholarship is admitted to the privileges of any of the regular College courses, (but not the Preparatory or special courses) free of the ordinary charges for incidentals, room-rent, and furniture; this immunity to continue for the entire College course, provided that both conduct and class-standing be satisfactory to the Faculty. A vacancy may be filled after the opening of the college year, if the appointee's attainments do not fall below the standard of the class at the time of application for admission. For information as to vacancies, time and place of examination, &c., candidates for a scholarship should apply to their Senator, in whose hands the details of appointment have been placed by the College.

6. Discipline.

The discipline of the College is intended to be strict, but reasonable and considerate. It assumes that students come here, not to spend their time in idleness, but to prepare themselves for useful and honorable careers in life. The aim of the Faculty is to lead students to cultivate habits of steady application, self-control, a high sense of honor, truthfulness, and an interest in maintaining the purity of the moral atmosphere of the institution. Those who are not disposed to support heartily a discipline of this kind are urged not to apply for admission. Students whose influence, after fair trial, is found to be injurious to good scholarship or good morals will be removed from the institution.

7. Expenses.

No charge whatever is made for tuition, except for special instruction in music.

INCIDENTALS.—Each student, whether from a distance or a resident in the neighborhood, is required to pay $17 a year for the fuel, lights, and care of the recitation and other public rooms, viz: $7 for the fall session, $5 for the winter, amd $5 for the spring. This is the only charge made to pupils who do not room in the College. The charges to those who room in the College are as follows;

FALL SESSION.—	Incidentals,	$7
	Room rent, fuel, and furniture,	11
WINTER SESSION.—	Incidentals,	5
	Room rent, fuel, and furniture,	14
SPRING SESSION.—	Incidentals,	5
	Room rent, fuel, and furniture,	8

The charge for room rent, fuel, and furniture is made on the basis of two persons to each room. In cases where a student rooms alone, he will be charged $4 additional per session.

By a resolution of the Board of Trustees, the Business Manager is required to collect from each student, before he is permitted to enter his name upon the College roll, an amount sufficient to cover all his college bills for the current session, besides a special deposit of $5 as security against damages; or, in case the student cannot pay immediately, to require a note, with sufficient security, for the payment at some future time, unless excused by the Executive Committee.

LABORATORY EXPENSES.—Students in the laboratories pay a small charge for their outfit; also, for apparatus destroyed and material consumed by them.

BOARDING.—The College does not maintain a boarding-hall, and most students depend upon the boarding-houses in the vicinity, the regular charge being $3 per week. The College offers special facilities to those who board themselves singly, and also to the College Boarding Club, which supplies its members, now numbering nearly forty, with good boarding at about $2 per week.

FURNITURE.—The furniture provided for students who room in the building consists of a bedstead, mattress, table, washstand, and chair. The student provides all other articles, including bedding, wash-bowl and pitcher, mirror, lamp, etc.

UNIFORM.—Each cadet is required to provide himself with a uniform of dark blue cloth—coat, pantaloons, and cap—as per pattern in the College. The cap and pantaloons are such as may be worn upon any occasion without attracting undue attention. One dress coat, with proper care, will last during an entire college course. Measures are taken at the College, and orders filled by Messrs. Wanamaker & Brown, Sixth and Market streets, Philadelphia. The uniform for cadets costs, at present, $16 35, viz: coat, $9 30; pantaloons, $5 69; cap, $1 45, and must be paid for when ordered.

MUSIC.—Instruction on the piano or organ will be given at the rate of $10 for twenty lessons, and $3 per quarter for use of instrument in practicing.

WASHING is at the rate of fifty cents per dozen.

BOOKS AND STATIONERY can be procured at stores near the College at Philadelphia retail prices.

DAMAGES.—Persons causing special damages will be required to pay for the same. General damages will be assessed upon the body of students.

All remittances should be made to the President, State College, Centre county, Pa., by draft or by money-order drawn on State College post-office

SESSIONS AND VACATIONS.

The College Year is divided into three sessions:

The Fall Session of about fourteen weeks, beginning on the second Wednesday of September, and ending on the third Friday of December; the Winter Session of twelve weeks, and the Spring Session of twelve weeks.

VACATIONS.—The winter vacation is three weeks, the spring, one, and the summer, ten.

BULLETINS OF EXPERIMENTS.

During the last year, the Bulletins of agricultural experiments have been continued, and the successive issues have been widely distributed throughout the State. For some numbers the demand has been so great as to exhaust our supply, and there have been numerous calls from other States as well as our own. The design is to make these Bulletins as practical as possible, giving the results of experiments, investigations, and discussions, and placing them directly and promptly in the hands of farmers and others interested in agricultural progress. The Bulletins are furnished free of charge, and to any person making application for them.

ADMISSION TO COLLEGE.

Examinations for admission are held on Tuesday of Commencement week, and on the day before the opening of the fall session, the dates being this year, (1886,) the 29th of June and the 7th of September, respectively. It is desirable, on every account, that candidates be present on one or both of these days. Those who cannot do so will be examined at any time during the year, and admitted to the class for which they are found prepared.

In all cases, the applicant for admission must present evidences of good character, and of honorable dismissal when coming from another college.

For admission to the Freshman class, candidates (of either sex) must be at least fifteen years of age, and pass a satisfactory examination in the following subjects:

1. FOR THE GENERAL SCIENCE COURSE: English Grammar, Arithmetic, Geography, both Descriptive and Physical; United States History; Higher Algebra, to Quadratics; Wentworth's Geometry, four books; and the Elements of Natural Philosophy.
2. FOR THE LATIN-SCIENTIFIC COURSE: The same as above, with the addition of four books of Cæsar, and three orations of Cicero.
3. FOR THE LADIES' COURSE: The same as for the General Science Course or the Latin-Scientific Course.
4. FOR THE GENERAL COURSE IN AGRICULTURE: The same as for the Preparatory Department, (see page 19.)
5. FOR THE SPECIAL COURSE IN AGRICULTURE: The same as for the General Science Course.
6. FOR THE SPECIAL COURSE IN CHEMISTRY: Applicants will be admitted without examination, except in Mathematics. In that branch no fixed amount will be absolutely required, at present, beyond a thorough knowledge of Arithmetic, including the Metric System; but, in order to derive the greatest advantage from the course, it is recommended that students be so far advanced as to have completed the mathematical studies of the Freshman year.
7. FOR THE COURSE IN MECHANIC ARTS: The same as for the General Course in Agriculture.
8. FOR PARTIAL COURSES, applicants must at least be prepared to enter the Freshman class in the branches of study which they wish to pursue. Such courses are not provided for students in the preparatory grade.
9. GRADUATES OF STATE NORMAL SCHOOLS and of a SELECT LIST OF HIGH SCHOOLS AND ACADEMIES in Pennsylvania, whose standard of requirements has been ascertained to be satisfactory, will be admitted to the Freshman class without further examination in studies which, as shown by their diploma or certificate, they have successfully completed in such institutions.
10. THE HOLDERS OF SENATORIAL SCHOLARSHIPS are admitted on the certificate of the examining committees in the several Senatorial districts.
11. APPLICANTS FOR ADVANCED STANDING, in any course, must pass a further examination in the studies which have been pursued by the class for which they are candidates.

THE FULL COURSES OF INSTRUCTION occupy four years, with three terms or sessions in each year. The following schedules of studies indicate the amount of work required in the several courses, and the equivalent which will be accepted from candidates for advanced standing.

SCHEDULES OF STUDY.

[Figures after subjects indicate hours of recitation or practice per week.]

1. GENERAL SCIENTIFIC COURSE.

Freshman Class.

FALL SESSION.—Algebra (3), Geometry (3), German (5), History (4).
Practicums—Drawing (4), Horticulture (4).

WINTER SESSION.—Trigonometry (3), Geometry (3), Rhetoric (4), German (5).
Practicums—Drawing (2), Mechanic Arts (6).

SPRING SESSION.—Trigonometry and Surveying (5), Physiology (3), German (5).
Practicums—First half of session—Horticulture (4), Physiology (4). Second half of session—Surveying (8).

Sophomore Class.

FALL SESSION.—Analytical Geometry (4), Chemistry (4), German (2), French (3), History (2).
Practicums—Drawing (6), Chemistry (4).

WINTER SESSION.—Analytical Geometry (4), Chemistry (4), German (2), French (3), History (2).
Practicums—Chemistry (8), Mechanic Arts (2).

SPRING SESSION.—Chemistry (3), Descriptive Botany* (4), History (2), French (3), Differential Calculus* (4).
Practicums—Chemistry (6), Botany (4).

Junior Class.

FALL SESSION.—Rational Mechanics (4), French (2), German (2), Logic (3), Botany (4), or Integral Calculus (3).
Practicums—Mechanics (4), Botany (4), Anatomy and Zoölogy (4).

WINTER SESSION.—Physics (4), French (3), Zoölogy (4), Constitutional History (4).
Practicums—Physics (4), Zoölogy (4), Botany (2).

SPRING SESSION.—Physics (4), Mineralogy (1), Mental Philosophy (4), English Literature (4), Zoölogy (2).
Practicums—Physics (3), Mineralogy (6).

Senior Class.

FALL SESSION.—Physics (4), Geology (4), Political Economy (4), English Literature (3).
Practicums—Physics (2), Geology (5).

WINTER SESSION.—Geology (2), Constitutional Law (4), Astronomy (3), History of Civilization (4), Physics (3).
Practicums—Geology (3), Physics (2).

SPRING SESSION.—International Law (4), Astronomy (3), Ethics (4), History of English Literature (3).
Practicums—Original work—elective (5), Thesis or Oration.

2. LATIN-SCIENTIFIC COURSE.

Freshman Class.

FALL SESSION.—Algebra (3), Geometry (3), German (5), Latin (4).
Practicums—Drawing (4), Horticulture (4).

WINTER SESSION.—Trigonometry (3), Geometry (3), Latin (4), German (5).
Practicums—Drawing (2), Mechanic Arts (6).

SPRING SESSION.—Trigonometry and Surveying (5), German (5), Latin (4).
Practicums—First half of session—Physiology (4), Horticulture (4). Second half of session—Surveying (8).

Sophomore Class.

FALL SESSION.—Analytical Geometry (4), Chemistry (4), History (2), Latin (3), French (3).
Practicums—Drawing (6), Chemistry (4).

WINTER SESSION.—Analytical Geometry (4), Chemistry (4), History (2), Latin (3), French (3).
Practicums—Chemistry (6), Mechanic Arts (2).

SPRING SESSION.—Chemistry (3), Descriptive Botany* (4), Differential Calculus* (4), Physiology (3), French (3).
Practicums—Chemistry (6), Botany (4).

[The studies of the last two years in this Course are the same as in the General Science Course.]

3. GENERAL COURSE IN AGRICULTURE.

First Year.

FALL SESSION.—Arithmetic (4), Algebra (3), Physiology (4), English Language (5).

WINTER SESSION.—Algebra (4), Zoölogy (5), U. S. History (3), English Composition (3).
Practicum—Book-keeping.

SPRING SESSION.—Algebra (5), Botany (5), English Composition (5).
Practicum—Drawing.

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*NOTE.—For the Differential Calculus of this session, students preparing for the Course in Agriculture or Natural History may substitute seven hours of practicum in Chemistry. Students preparing for the Course in Civil Engineering will substitute Railroad Surveying for Descriptive Botany.

Second Year.

FALL SESSION.—Algebra (5), Natural Philosophy (5), Elements of Agricultural Chemistry (5).
Practicums—Drawing (4), Horticulture (4).
WINTER SESSION.—Algebra (4), Geometry (2), Natural Philosophy (4), Elements of Scientific Agriculture (5).
Practicum—Mechanic Arts(6).
SPRING SESSION.—Geometry (5), Descriptive Botany (5), Elements of Scientific Agriculture (5).
Practicums—Botany(4), Horticulture(4).

Third Year.

FALL SESSION.—Chemistry (4), Horticulture (3), Geometry (3), Mechanics (4).
Practicums—Chemistry (4), Zoölogy (4), Mechanics (4).
WINTER SESSION.—Chemistry (4), Geometry (3), Trigonometry (3), Zoölogy (4).
Practicums—Chemistry (8), Zoölogy (4).
SPRING SESSION.—Agricultural Engineering (3), Comparative Physiology (3), Trigonometry and Surveying (5), Mental Philosophy (4).
Practicums—Chemistry, one half term, Quantitative Analysis(10), Surveying, one half term(8).

Fourth Year.

FALL SESSION.—Agricultural Chemistry(3), Anatomy and Breeding (4), Botany(4), Political Economy (4).
Practicums—Dissection (2), Chemistry (Quantitative Analysis) (4), Botany (4).
WINTER SESSION.—Agricultural Chemistry (4), Feeding (4), Veterinary Science (3), U. S. Constitution (4).
Practicums—Care of Stock (4), Analysis of Agricultural Products (6).
SPRING SESSION.—Fertilizers (4), Entomology (4), Dairy Farming (3), Moral Philosophy (4).
Practicums—Agriculture (6), Entomology (6).

4. ADVANCED COURSE IN AGRICULTURE.

[The studies of the first two years in this Course are the same as in the General Science or the Latin-Scientific Course.]

Junior Class.

FALL SESSION.—Rational Mechanics (4), Agricultural Chemistry (3), Cryptogamic Botany (4), Logic (3).
Practicums—Physics (4), Chemistry (6).
WINTER SESSION.—Physics (4), Agricultural Chemistry (4), Zoölogy (4), Agricultural Engineering (3).
Practicums—Zoölogy or Physics (4), Chemistry (6).
SPRING SESSION.—Mineralogy (1), Mental Philosophy (4), Entomology (2), Fertilizers (4), Crops (1), Zoölogy (2).
Practicums—Agriculture (4), Entomology (6).

Senior Class.

FALL SESSION.—Anatomy and Breeding (4), Geology (4), Political Economy (4), Horticulture (3), Crops (3).
Practicums—Agriculture (5), Dissection (5).
WINTER SESSION.—Geology (2), Constitutional Law (4), Feeding (4), Veterinary (4). Farm Economy (1).
Practicum—Agriculture (10).
SPRING Session.—Dairy (3), Sheep Husbandry (1), Ethics (4), History of English Literature (3), History of Agriculture (1).
Practicum—Agriculture, (original work) Thesis.

5. SPECIAL COURSE IN AGRICULTURE.

[See explanation on page 11.]

First Year.

FALL SESSION.—Chemistry (4), Algebra (3), Geometry (3), Natural Philosophy (5).
Practicums—Horticulture (4), Chemistry, (4), Drawing (4).

WINTER SESSION.—Chemistry (4), Agricultural Engineering (3), Geometry (3), Rhetoric (4).
Practicums—Chemistry (8), Mechanic Arts (6).
SPRING SESSION.—Chemistry (3), Physiology (3), Botany (4), Trigonometry (5).
Practicums—Chemistry (4), Horticulture (2), Botany (4), Physiology (2).

Second Year.

FALL SESSION.—Agricultural Chemistry (3), Anatomy and Breeding (4), Botany (4)' Surveying (2).
Practicums—Chemistry (6), Dissection (5), Surveying (3).
WINTER SESSION.—Agricultural Chemistry (4), Cattle Feeding (4), Zoölogy (4).
Practicums—Chemistry (6), Zoölogy (4), Agriculture (6).
SPRING SESSION.—Fertilizers (4), Entomology (4), Dairy Farming (4), Sheep Husbandry (1), Zoölogy (2).
Practicums—Entomology (6), Agriculture (6).

NOTE.—Students whose previous training has not been such as to enable them to take up the above course with advantage will find it desirable to spend a time, longer or shorter, according to circumstances, in the Preparatory Department.

6. COURSE IN CHEMISTRY AND PHYSICS.

[The studies of the first two years in this Course are the same as in the General Science or Latin-Scientific Course.]

Junior Class.

FALL SESSION.—Rational Mechanics (4), Chemistry (3), Logic (3), Integral Calculus (3).
Practicums—Mechanics (4), Chemistry (8).
WINTER SESSION.—Physics (4), Chemistry (4), Method of Least Squares (2).
Practicums—Physics (4), Chemistry (16).
SPRING SESSION.—Physics (5), Chemistry (4), Mineralogy (1), Mental Philosophy (4).
Practicums—Physics (3), Chemistry (3), Mineralogy (6).

Senior Class.

FALL SESSION.—Physics (4), Chemistry (3), Geology (4), Political Economy (4).
Practicums—Physics (4), Chemistry (8).
WINTER SESSION.—Physics (3), Chemistry (3), Geology (2), Constitutional Law (4).
Practicums—Physics (4), Chemistry (14).
SPRING SESSION.—Physics (4), Chemistry (3), Ethics (4), History of English Literature (3).
Practicums—Physics (3), Chemistry (10), Thesis.

7. COURSE IN CIVIL ENGINEERING.

[The studies of the first two years in this Course are the same as in the General Science or the Latin-Scientific Course.]

Junior Year.

FALL SESSION.—Rational Mechanics (4), Integral Calculus (3), Descriptive Geometry (4), Mechanical Drawing (2), Graphical Statics (3).
Practicums—Surveying (6), Experimental Mechanics (4).
WINTER SESSION.—Applied Mathematics (3), Method of Least Squares (2), Physics (4), Descriptive Geometry (3).
Practicums—Mechanical Drawing (8), Physics (4).
SPRING SESSION.—Analytical Mechanics (2), Properties of Materials (3), Railroad Engineering (3), Physics (4), Mineralogy (1).
Practicums—Topographical Surveying (6), Mineralogy (6).

Senior Year.

FALL SESSION.—Graphical Statics (4), Political Economy (4), Analytical Mechanics (3), Geology (4).
Practicums—Geology (4), Field-work (4).
WINTER SESSION.—Constitutional Law (4), Geodesy and Practical Astronomy (6), Graphical Statics (4), Sanitary Engineering (4).
Practicum—Draughting (12).
SPRING SESSION.—Specifications and Contracts (2), Map Projections (3), Ethics (4).
Practicums—Field Practice (4), Draughting (2), Thesis.

8. COURSE IN NATURAL HISTORY.

[The studies of the first two years in this Course are the same as in the General Science or the Latin-Scientific Course.]

Junior Class.

FALL SESSION.—Rational Mechanics (4), Cryptogamic Botany (4), Animal Physiology (4), Logic (3).
Practicums—Mechanics (4), Botany (4), Zoölogy (4).
WINTER SESSION.—Physics (4), Zoölogy (4), Phænogamic Botany (3), Constitutional History (4).
Practicums—Physics (3), Zoölogy (2), Botany (4).
SPRING SESSION.—Physics (4), Mineralogy (1), Mental Philosophy (4), Entomology (2), Zoölogy (2).
Practicums—Mineralogy (6), Entomology (6).

Senior Class.

FALL SESSION.—Anatomy and Breeding (4), Geology (4), Political Economy (4), Zoölogy (5).
Practicums—Geology (5), Zoölogy (6).
WINTER SESSION.—Geology (3), Constitutional Law (4), Astronomy (3), Embryology (4).
Practicums—Geology (3), Embryology (8).
SPRING SESSION.—Geology (3), Astronomy (3), Ethics (3), History of English Literature (3).
Practicum—Original Work—elective (5), Thesis.

9. SPECIAL COURSE IN CHEMISTRY.

First Year.

FALL SESSION.—General Chemistry (4), Mathematics (5), German (5).
Practicum—Laboratory Practice.
WINTER SESSION.—Chemistry (4), Mathematics (5), German (5).
Practicum—Qualtitative Analysis.
SPRING SESSION.—Chemistry (3), German (5), Mathematics, optional.
Practicum—Qualtitative Analysis.

Second Year.

FALL SESSION.—German (2), Mathematics, optional; Chemistry, with Quantitative Analysis.
WINTER SESSION.—German (2), Mathematics, optional; Chemistry, with Quantitative Analysis.
SPRING SESSION.—Mathematics, optional; Chemistry, with Quantitative Analysis.

THE PREPARATORY DEPARTMENT.

This department is intended to furnish instruction to students well trained in the Elementary Common School Branches, and yet not fully prepared for admission to the Freshman class. It does not, however, offer instruction in the Primary branches, nor is it in any sense a high school. The studies are arranged chiefly with reference to their importance in preparing students for one of the regular College Courses, namely, the General Science or the Latin-Scientific.

Special care is taken to make the instruction systematic and thorough, that the foundation for future study may be securely laid.

Students in this department, except those who are under the immediate care of their parents or guardians, are required to room in that part of the building assigned to the department. Here they are under the personal supervision of the principal of the department and his assistants.

In addition to the regulations governing the College students, they are required to observe study hours. During such periods they must neither pay nor receive visits; and every effort is made to train them to habits of close attention and to correct methods of study. At other times than in recitation and study hours, preparatory students can associate with the College students, and thus have the benefit of their experience in literary societies, recreations, &c.

ADMISSION.

FIRST YEAR.—All applicants for admission must be at least fourteen years of age, and be prepared, at the beginning of the antumn session, to pass a satisfactory examination in the following branches:

Arithmetic—Robinson's Complete (or its equivalent) to Ratio; English Grammar, Brown's Revised (or its equivalent) to page 250, which includes Etymology and Syntax.

In Geography, Spelling, Reading, and Penmanship, the examination must show such acquaintance with those branches as not to require further instruction in them.

SECOND YEAR.—Those who apply for admission to the autumn session of the *Second Year* must be prepared to pass, in addition to the above, an examination on all the work of the *First Year*.

All persons entering classes after the opening of the first session will be required to pass an examination in the work already gone over by the class into which they seek admittance.

TUITION in this department is free; other charges are the same as in the College proper.

EXAMINATION for ADMISSION, Tuesday, September 7, 1886, at 9 o'clock, A. M.

SCHEME OF WORK.

In connection with the Schedule, the following outline of work will indicate the course of studies more in detail:

First Year.

FALL SESSION.—Newcomb's Elementary Algebra, to page 80.
Thompson's Complete Arithmetic, completed from Ratio.
Hutchison's Physiology and Hygiene.
Well's English Grammar, completed from Syntax.
Comstock's First Latin Book, fifty lessons.

WINTER SESSION.—Algebra, continued to page 152.
Parker's Exercises in English Composition, to Part III.
Scudder's History of the United States, to Part III.
Comstock's Lessons in Latin, completed.

SPRING SESSION.—Algebra, continued to page 210.
English Composition, completed.
Scudder's History of the United States, completed.
Cæsar, first two books.
Morse's First Lessons in Zoölogy.

Second Year.

FALL SESSION.—Newcomb's Algebra for Colleges, page 85 to 200.
Wentworth's Plane Geometry, to page 54.
Avery's Natural Philosophy, to Chapter VII.
Lancaster's History of England.
Cæsar, Books III and IV; and Allen's Composition, first 13 lessons.

WINTER SESSION—Algebra, continued to page 272.
Natural Philosophy, completed.
Colegrove's Scientific Grammar.
Wentworth's Plane Geometry, to page 102.
Cicero—first two Orations in Catilinam; Composition continued to 24th Lesson.

SPRING SESSION—Geometry, continued through fourth book.
Algebra, continued to page 320.
Houston's Physical Geography.
Cicero—Third and Fourth Orations in Catilinam.
Composition, continued to 34th Lesson.

SCHEDULE OF STUDIES.

YEAR.	Session.	SCIENTIFIC COURSE.	Hours per week.	LATIN-SCIENTIFIC.	Hours per week.
"B," or First Year.	Fall.	Algebra,	4	Algebra,	4
		Arithmetic,	3	Arithmetic,	3
		Physiology,	4	Physiology,	4
		English Grammar,	5	Latin,	5
	Winter.	Algebra,	5	Algebra,	5
		English Composition,	5	English Composition,	5
		United States History,	5	Latin,	5
		Zoölogy,	5	Zoölogy,	5
	Spring.	Algebra,	5	Algebra,	5
		United States History,	5	United States History,	5
		English Composition,	5	Latin,	5
		Drawing,	3	Drawing,	3
		Book-keeping,	4	Book-keeping,	4
"A," or Second Year.	Fall.	Geometry,	2	Geometry,	2
		Algebra,	4	Algebra,	4
		Physics,	4	Physics,	4
		English History,	5	Latin,	5
		Drawing,	5	Drawing,	5
	Winter.	Algebra,	4	Algebra,	4
		Geometry,	2	Geometry,	2
		Physics,	4	Physics,	4
		English,	5	Latin,	5
		Drawing,	5	Drawing,	5
	Spring.	Algebra,	2	Algebra,	2
		Geometry,	4	Geometry,	4
		Physical Geography,	5	Physical Geography,	5
		Botany,	4	Latin,	5
		Drawing,	5	Drawing,	5